Excavating Engineer

founded 1905

OCTOBER
1959

Millions of yards of dirt and gravel fill are going into California's Trinity Dam. This 8-yd. load of gravel is dumped by a loading shovel into a 30-yd. hauler. See article on page 8.

Honest, Johnny... that's a real truck!

Johnny's confused! This Bucyrus-Erie excavator makes the truck look like a toy. But the fact that the Bucyrus machine towers over other equipment is not really important to its owners. What they like are its towering production records. Just think, in 24 hours it can remove over 120,000 tons of overburden!

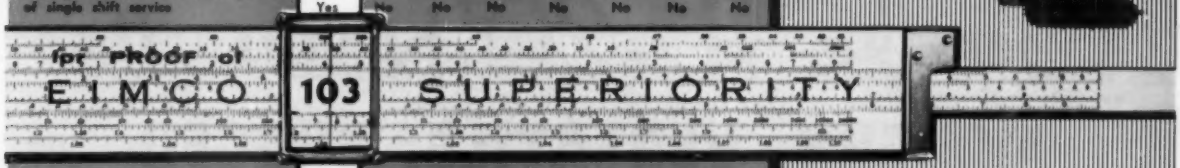
Now is the time to take a fresh look at *your* operation and equipment. It is certain that somewhere in the B-E line there is an excavator that will fit your exact needs. Bucyrus-Erie builds shovels from ⅜ yards on up through 65 cubic yards. And, through the entire line, Bucyrus-Erie machines are GIANTS when it comes to production.

BUCYRUS ERIE

B-451

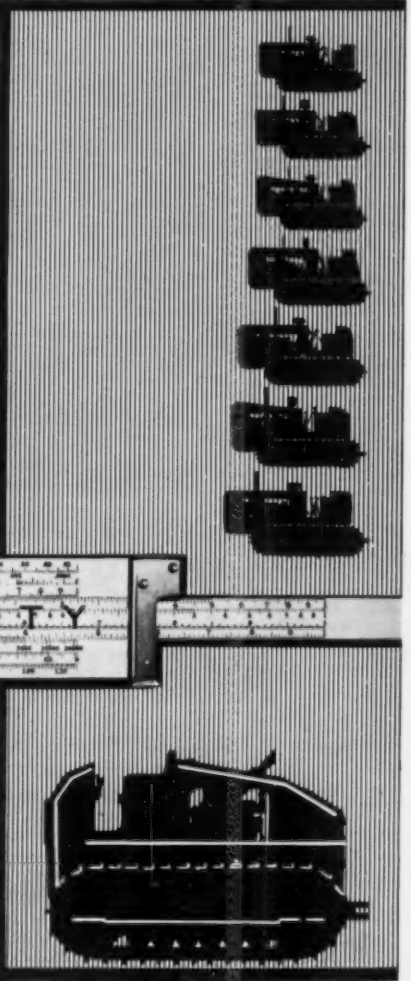
EIMCO CHALLENGES YOU TO COMPARE THE FACTS NOT THE CLAIMS

	EIMCO 103	CAT D-4	CAT D-6	AC HD-6	AC HD-11	INT. TD-9	INT. TD-15	CASE 1000
Maximum Drawbar Pull (zero track slippage)	33,000	19,700	19,000	15,485	21,980	13,240	23,750	24,000
Torque Converter	Yes	No	No	No	No	No	No	Yes
Master Clutch	No	Yes	Yes	Yes	Yes	Yes	Yes	No
Power shift transmission on all speeds, with oil cooled metallic clutches that never need adjustment	Yes	No	No	No	No	No	No	No
Independently reversible track	Yes	No	No	No	No	No	No	Yes
Hydraulic track take-up	Yes	No	No	No	No	No	No	Yes
Heat-treated alloy steel grouser shoes, keyed to the track links	Yes	No	No	No	No	No	No	No
One-piece heat-treated alloy steel track rollers, tapered roller bearings	Yes	No	No	No	No	No	No	No
Equalizer bar of heavy duty heat-treated cast alloy steel, allowing full oscillation of crawler tracks with all attachments	Yes	No	No	No	No	No	No	No
Constantly running power take-off drives, front and rear, to standard SAE specs, with rear take-off not affected by track operation, and independent hydraulic pump drive allowing simultaneous use of hydraulic, winch and hoist accessories	Yes	No	No	No	No	No	No	No
Front operator's seat for full visibility	Yes	No	No	No	No	No	No	No
Ability to operate forward and backward on up to 90% slopes	Yes	No	No	No	No	No	No	No
Tractor guaranteed for one full year of single shift service	Yes	No	No	No	No	No	No	No



	EIMCO 103	CAT D-4	CAT D-6	AC HD-6	AC HD-11	INT. TD-9	INT. TD-15	CASE 1000
WEIGHT BARE TRACTOR, POUNDS	15,000	10,910	17,605	12,600	20,500	11,925	22,540	13,200
H.P. — FLYWHEEL	100	63	93	66	99	71	105	90
TRACK GAUGE, INCHES (STD.)	60	60	74	60	74	60	74	60
STD. TRACK SHOE WIDTH, INCHES	16	13	16	13	16	13	16	16
LENGTH OF TRACK ON GROUND, INCHES	88	61	85¾	66⅞	85¼	73	89⅝	79
TOTAL TRACK AREA, SQ. INCHES	2,820	1,389	2,744	1,739	2,744	1,896	2,858	2,528
GROUND PRESSURE, PSI.	5.3	6.9	6.4	7.3	7.5	6.3	7.9	5.2
TRACK ROLLER DIAMETER, INCHES	8	8	8	7⅝	7½	N.A.	10½	6
TRACK RAIL WIDTH, INCHES	1⅜	1¼	1¼	1⅝	1⅜	N.A	N.A.	1⅜
NUMBER TRACK ROLLERS, EACH SIDE	6	4	6	5	6	5	6	5
TRACK BOLT DIAMETER, INCHES	⅝	½	⅝	11/16	⅝	½	⅝	½
TRACK BUSHING DIAMETER, INCHES	2 3/32	2	2⅛	2	2⅛	2⅛	2¼	1 27/32
TRACK PIN DIAMETER, INCHES	1 17/32	1⅜	1⅜	1⅜	1⅜	1⅜	1½	1¼
SPROCKET PITCH DIAMETER, INCHES	32½	29¼	30½	28⅛	31½	28¼	30½	24½
GROUND CLEARANCE, INCHES	17	11½	12½	11¼	12½	10⅛	11	16

N.A. — not available



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IT'S A FACT . . . not a claim . . . that here is a MODERN line of tractors that makes all other crawler-tractors old-fashioned!

Other exclusive features includes Unitized "Stress Flow" Construction, for far greater strength and rigidity; Self-cleaning Air Cleaner that completely eliminates ordinary routine cleaner maintenance and others, far too numerous to list here. Write for details and specifications on all the advanced engineering features of the modern Eimco 103 line of crawler tractors.

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103 — TRACTOR AND DOZER
123 — FRONT END LOADER
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Likes the TL-20 because it's

MODERN, VERSATILE, RUGGED

With 325 miles of northern Illinois roads to look after and a budget to watch, Field Superintendent H. B. Brown, of Winnebago County, makes sure the equipment he has is modern and efficient in every respect.

He points out his TL-20 TRACTOLOADER as a good example because it is fast, does all kinds of jobs in the yard or out on the network of roads — and it's rugged.

Here are some of the jobs the TL-20 handles and the reasons it does 'em so well.

LOADS TRUCKS — Operator goes into and out of any gear at will with one lever — shortens loading time by using fastest gear working conditions allow. One-lever speed and direction control is an Allis-Chalmers exclusive!

STOCKPILES — Low carry and extra stability means no spilling and tipping — extra operator comfort.

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Excavating Engineer

founded 1905

South Milwaukee, Wisconsin

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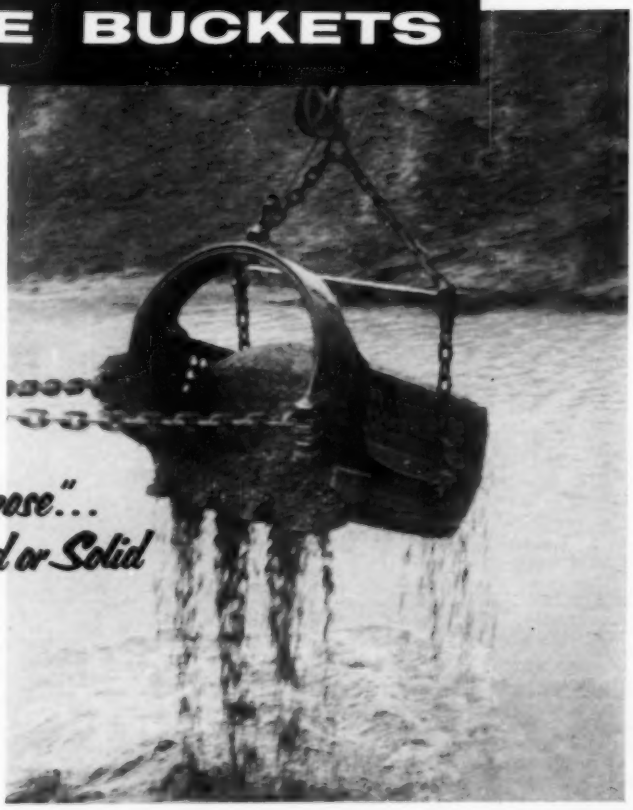

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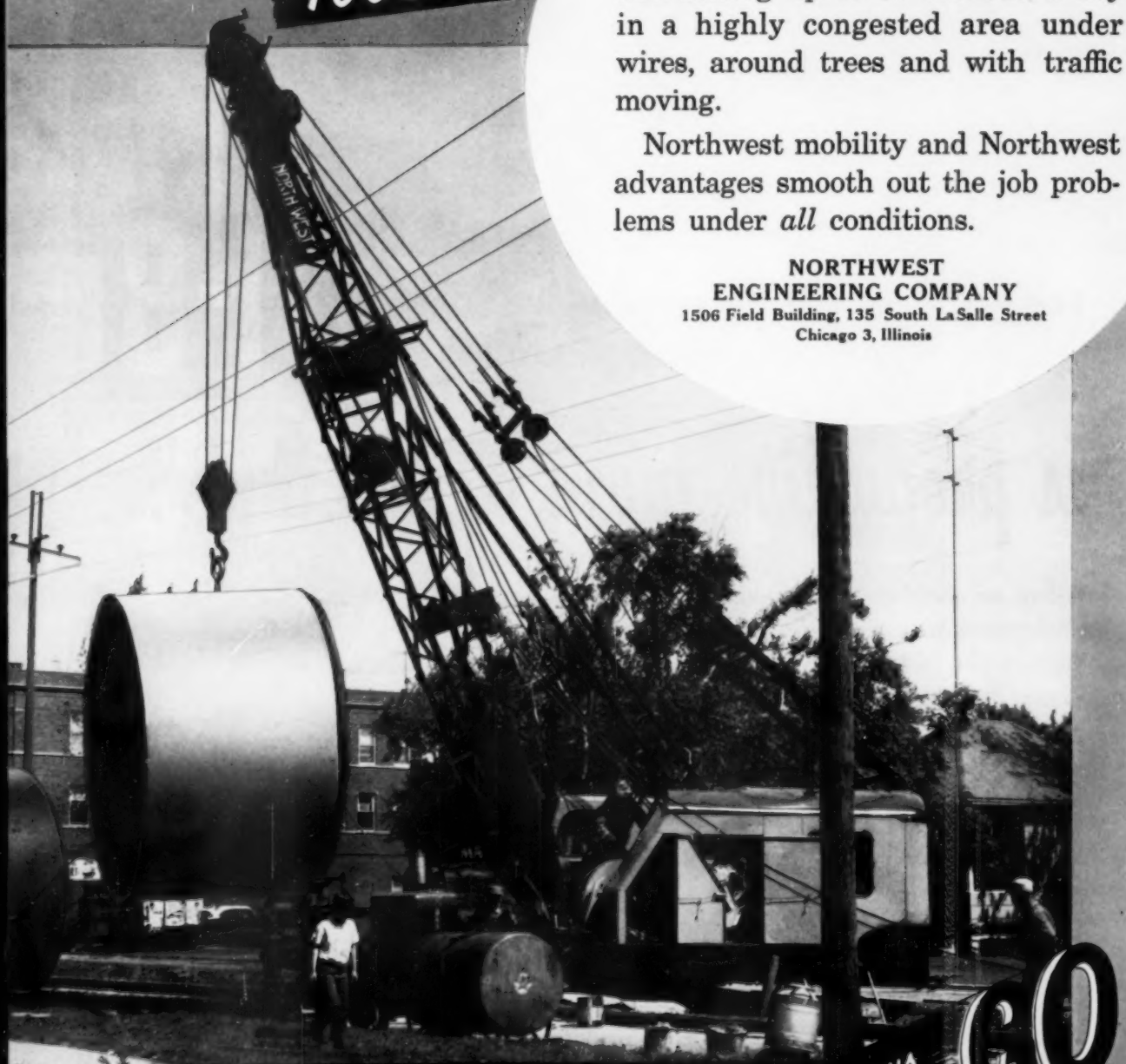

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SHOVELS	CRANES	DRAGLINES	PULLSHOVELS	TRUCK CRANES
⅜ Yd. to 2½ Yd. Capacity	12-Ton to 60-Ton Capacity	¾-Yd. to 3 Yd. Capacity	⅜ Yd. to 2½ Yd. Capacity	25-Ton and 35-Ton Capacity

S-15-ICO

Here's why the low-cost Bucyrus-Erie 11-B

is productive more of the time!

There are more time- and money-saving features on this high-speed mobile crane-excavator than any other in its class! From top to bottom it is clean, easy to maintain, easy on the budget. The 11-B is the kind of profit machine that is *not only more productive* but productive more of the time . . . take a look!

2-Section Cab Lets You Get to Machinery Fast!

The streamlined 11-B cab has folding and sliding panels that open up to let you get at the entire main machinery. You can see what you're doing . . . the machine gets back on the job sooner!

Save Clutch Adjustment Time!

Warm or cool, 11-B clutches perform evenly because of preloaded equalizing springs that react to temperature changes, adjust accordingly. Clutches stay smooth and firm throughout the day!

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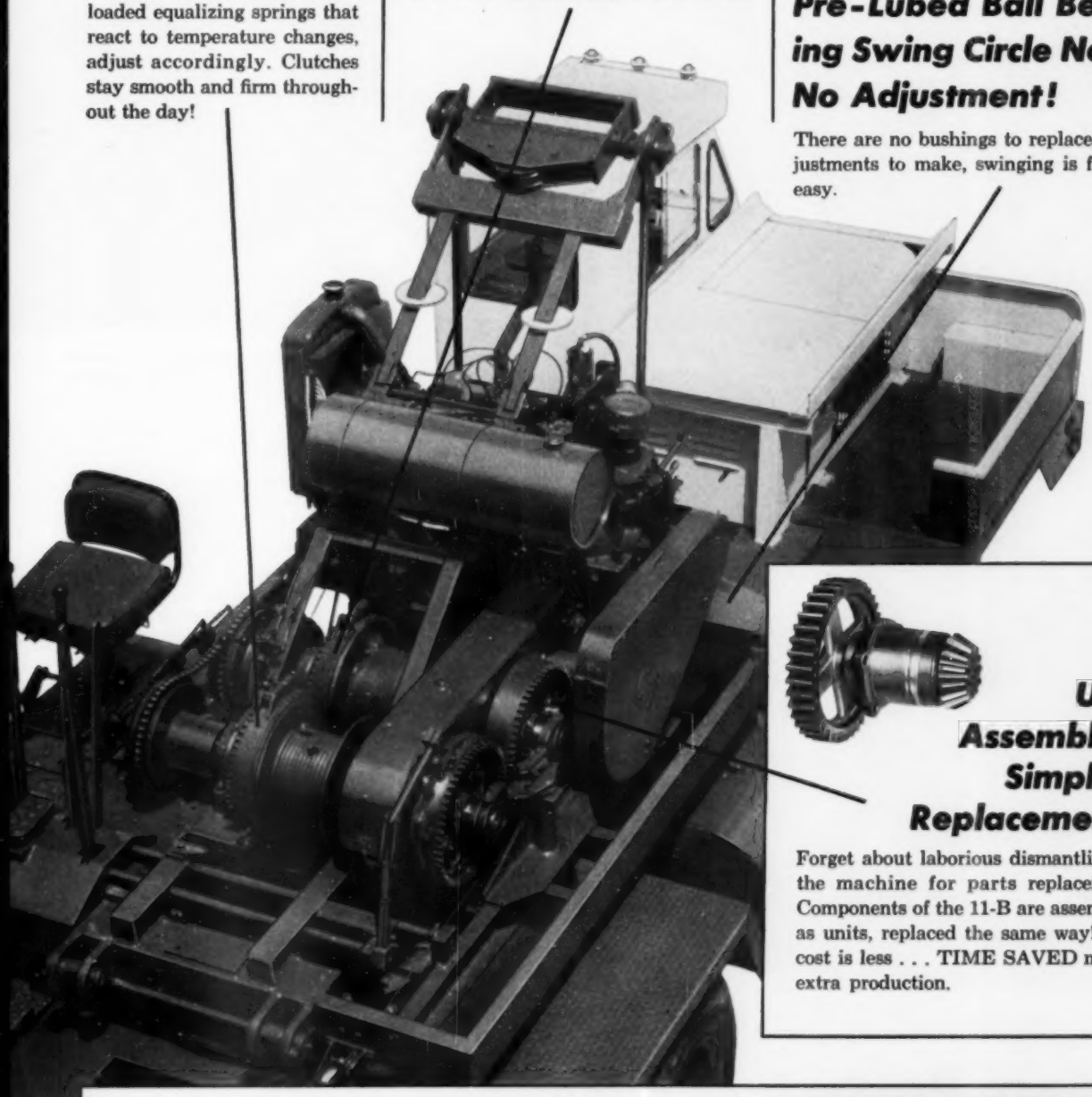
Bands are reversible for longer wear; one set is an adequate reserve stock!

Pre-Lubed Ball Bearing Swing Circle Needs No Adjustment!

There are no bushings to replace, no adjustments to make, swinging is free and easy.



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Forget about laborious dismantling of the machine for parts replacement. Components of the 11-B are assembled as units, replaced the same way! The cost is less . . . TIME SAVED means extra production.

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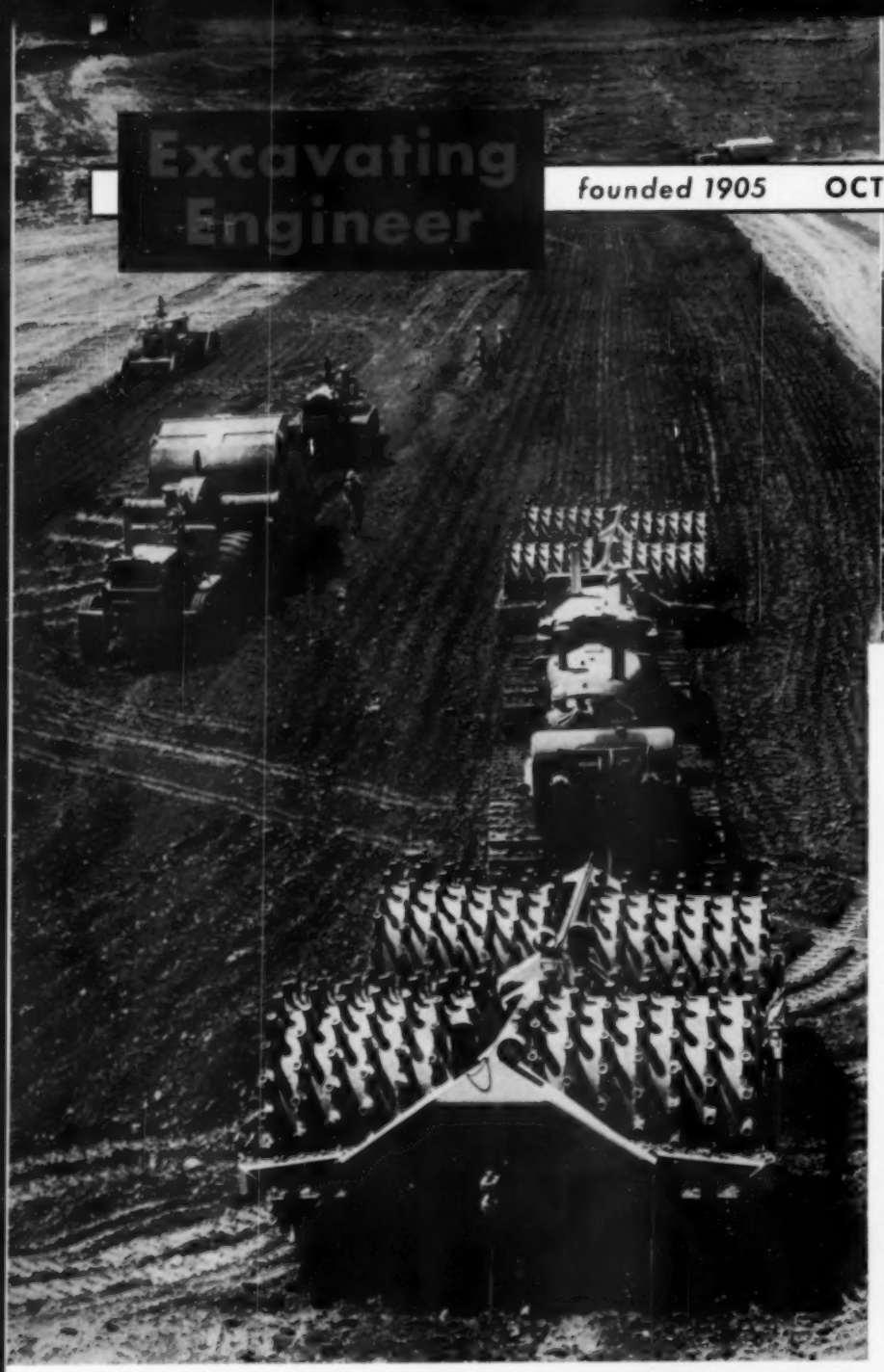


Sheepsfoot rollers compact the impervious clay core of Trinity Dam. Earth brought in by a 20-yd. Cat DW20 scraper is leveled into 6-in. lifts by a D8 dozer following.

(Above) A DW20 loads out of a borrow pit with the assistance of a D9 pusher.

Mass Production Keynotes Trinity Dam Project

How do you set up and operate a dam project for 90,000 cubic yards of embankment a day? A joint venture group of contractors, headed by Guy F. Atkinson Co., shows how it's done.

by Ray Day

MASS production, the contractor's answer to rising costs of labor and equipment, has taken the starring role in the construction of Trinity Dam. Shooting for 90,000 cubic yards a day and completion of the giant earthfill barrier nearly one year ahead of the contract completion time allowed by the federal government, Trinity Dam Contractors seem to have found the answer to fast, economical construction work.

Their job is big. The contract is just a few dollars short of $49 million. The four-zone earth and rock fill barrier, which will hold back 2½ million acre-feet of the unruly Trinity River near Lewiston, Calif., will contain 33 million cubic yards of material. Outlet tunnels and construction of the intake structure also is called for by the U. S. Bureau of Reclamation as a part of the contract.

The job is tough. And "tough" is no writer's term. For an explanation of some of the toughness, listen to Project Manager A. H. Steiner.

"One of the problems," he explained, "was the matter of 9 million yards of clay for the Zone One core. Nine million yards is a fair-sized slug of clay. Funny thing, too, the place Mother Nature chose to put that clay was 1,500 feet above the dam and three miles distant.

"That elevation differential, along with the haul, pretty much ruled out

the use of conventional hauling units. That's why we're using a conveyor. But we geared up right to handle the problem, and it's working about as smooth as any other part of the job."

Other things about the job were amazingly difficult, too. Cleanup of the Trinity River foundation down to good greenstone rock was a nightmare, before it was finished. Why? Because in many places equipment had to go down 25 feet more than what was predicted. When it got there, the cleanup job still wasn't done on account of small pockets, fissures between outcrops, and the like. Too, grout-cap construction, serving the same purpose as a core trench, had to be finished before the first earthfill could be placed. Finally, in many a spot the first earthfill had to be placed in tight, constricted places by hand-tamping guns. Think of it . . . the foundation was nearly a half-mile wide at the base—2,679 feet to be exact—and men with hand tampers had to work with the jagged, pockmarked foundation up to the point where high-production equipment could take over!

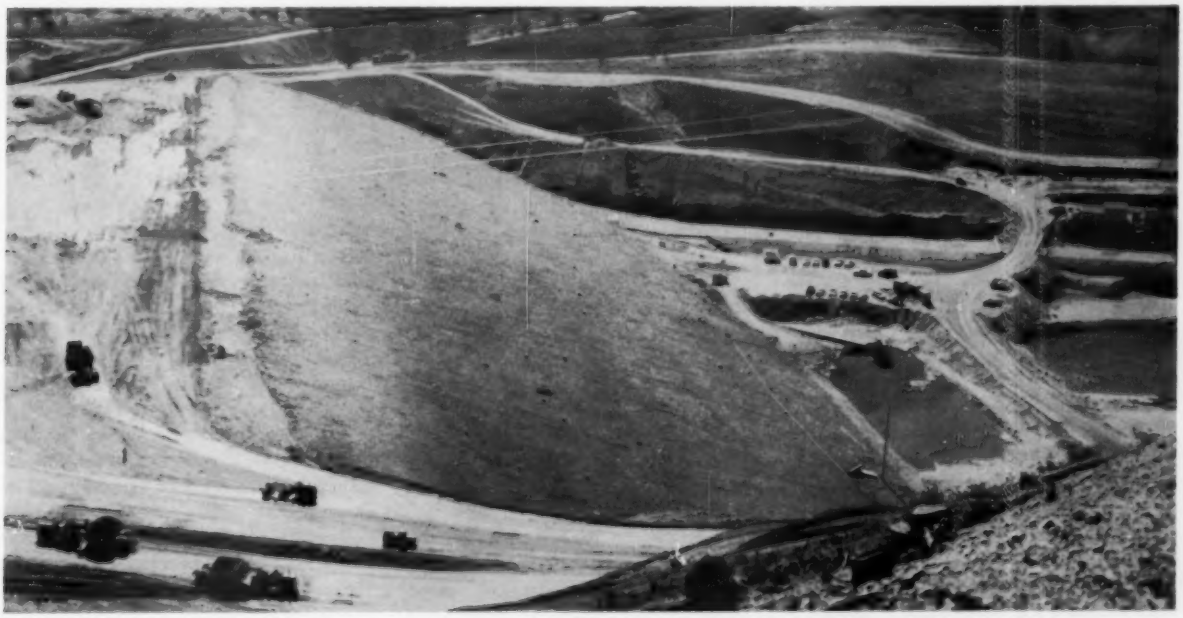
Preliminary work like that took time, and it explains why high production now is the keynote to the job's success. Five contracting firms, representing what remains of the combine which bid and built Harlan County Dam so successfully in Nebraska a few years ago, also are watching progress very carefully. They include sponsor Guy F. Atkinson Co.; Ostrander Construction Co.; M. J. Bevanda Corp.; A. Teichert & Sons; and Charles Harney, Inc. Together, they make what is known as Trinity Dam Contractors.

Started in 1957

Progress has followed a master plan almost to the letter, dovetailing operations into each other with ease and accuracy. The job was let early in 1957, and was started right after that.

First-year work saw first-stage river diversion finished, including an upstream earth and rock cofferdam and outlet tunnel. The gate shaft excavation was completed. Crews and equipment lined the invert of the diversion tunnel, while equipment shuttled busily back and forth to build the diversion cofferdam. When diversion of the river had been made, the terrific battle to clean up the dam foundation began. This will be detailed a bit later in this article.

By August 1957, the foundation was ready to receive its first fill. By October, fill in all zones had been brought back up to the original level of the old river bed. Then came disaster, of a sort. Early fall rains swelled the Trinity River out of all proportion to its normal flow at that time. The upstream coffer-



Size of the big embankment dwarfs earthmoving equipment. When completed, the structure will contain 33 million yards of fill.

Hand labor is needed to clean the bedrock of the dam's foundations. Placing of the impervious core is starting in background.

dam crumbled. And the wild Trinity, in one last effort, roared again through the dam area.

But the crews had done their work well. There was no deep, irreparable damage. Superintendent Joe McNabb said, "I guess you'd say our feelings were hurt, more than anything else. We hated to see the flood, and we hated to lose a good month's production we'd figured on. But aside from that, damage to the work we'd put in was minor."

During the winter of 1957, crews lined the diversion tunnel with concrete, completed pressure grouting up to Elevation 2050, about 200 feet above the dam foundation. Excavation of the glory-hole spillway shaft was done that winter, along with excavation of an auxiliary outlet tunnel and gate chamber. Construction of the 3-mile beltline conveyor also was done, because the very limited supply of clay for the Zone 1 impervious core had been exhausted down at dam level.

1958 saw the battle with the river begin anew in June, when the Trinity was again diverted. Scrapers and small shovels cleaned up gravel and boulders which had been deposited over the fill by the flood. Placement of fill began late in July. That year the contractors concentrated heavily on placement of the heavy rock zones which make up the upstream and downstream toes. In fact, during one time that year a Bucyrus-Erie 150-B and 120-B shovel worked like fury to send 13,000 cubic yards a day into these zones from the quarry above the dam.

In 1958, the downstream half of the dam was built up to Elevation 2060; the upstream half up to Elevation 2020. Fall rains and bad weather forced a shutdown for the winter in November 1958. That winter, extensive equipment maintenance and repair was done, grouting was carried up to Elevation 2150, and curtain grouting also was done.

Reached Peak

1959 saw resumption of work on the fill in April. This is the big year for fill production, and Steiner is getting a huge block of material in. The operation went into high gear on a double-shift basis in April; in May there was a change to double 9-hour shifts, which will stay for the balance of the 1959 season. The fill is expected to be finished by the end of 1960. 1961 will see final completion of all other appurtenant items, if the contractor's ambitious schedule holds. That will be a full year ahead of what the USBR provided for in its specifications.

Project Manager A. H. Steiner runs large scale job for Trinity Dam Contractors.

In ages past, alluvial fill tumbling down the turbulent Trinity accumulated over foundation rock in the river bed. On the abutments, too, red soil and gravel lay over the greenstone rock. There were few outcrops which were solid or clean. All had to be cleaned off with equipment, then sluiced down with high-pressure hydraulic monitors to expose a clean surface.

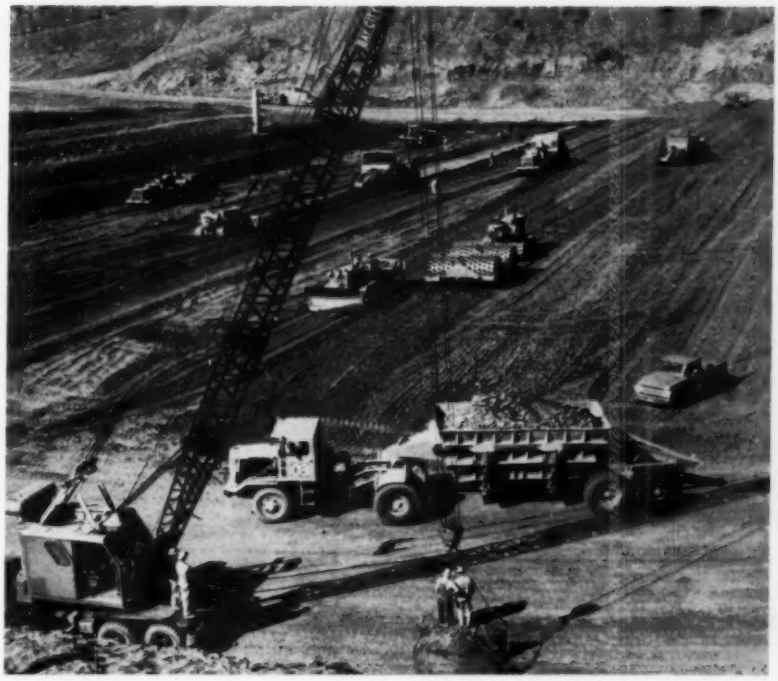
Cleaning off the abutments was primarily a job for pioneering dozers, and for small-size shovels and a companion fleet of hauling units. Many of the Caterpillar D8 and D9 bulldozers, which Trinity Dam Contractors brought in, were assigned to abutment stripping. There is an enormous 2 million-yd. slide near the left abutment. It is being excavated by a Cat DW20 scraper fleet for use in the buffer material of Zone 2. The big slide is being left in safe condition, with 20-ft. berms every 50 feet of elevation.

The foundation was worse. In ages past, fast-flowing water had gouged out the softer parts of foundation rock, leaving hard knobs protruding. Great gouges and depressions occurred all

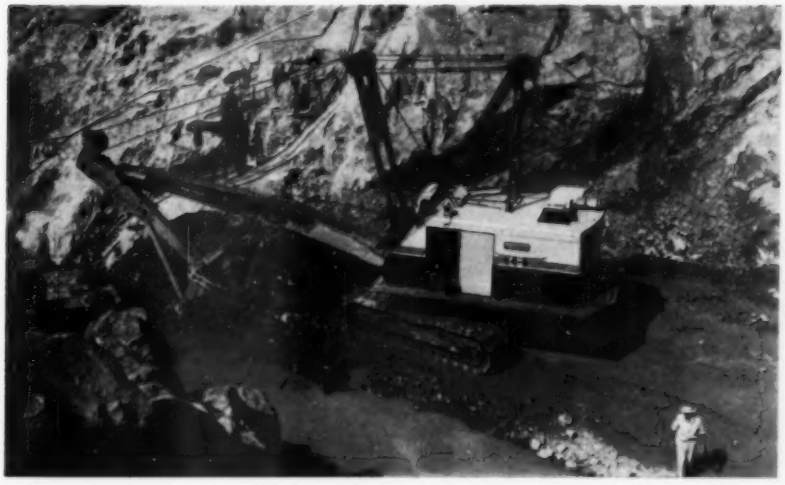
along the bottom. To make things worse, many times when hoes picked up the last remaining material which appeared loose something thereby would move, and it, too, then had to be dug out. In Zone 1, which is over 900 feet wide at its base, excavation was carried 25 feet deeper than anyone had planned to get down to solid greenstone rock. And after that the rock caps had to be placed.

A number of small machines rigged as hoes and draglines have been brought in to help out on the foundation and, later on, to do miscellaneous crane work, structure excavation and so on. These included two Bucyrus-Erie 54-B's, a 38-B and a 22-B, all of which were used to excellent advantage on the foundation work. The 54-B's operated principally as hoes loading overburden material to Euclid end-dump trucks, and there was also some dragline work. The 22-B saw service in tighter places. So did the 38-B.

The really tough work came about after the main block of overburden had been removed. At that point, it was hand labor and shirt-tail digging, along with hydraulic sluicing by monitors. Specifications called for clean, firm, solid



A Bay City truck crane is assigned to handling skips of loose rock scraped off the dam abutment. A bottom-dump truck carries waste to a disposal site. (Below) A 2½-yd. hoe picks out mammoth boulders which litter various levels of the excavation.



rock under Zone 1, and good sound material in the outer zones. In some of the final work under Zone 1, small, portable Gardner-Denver compressors and hand-held jackhammers block-holed many of the big boulders, which were then picked up by the small machines. It was a slow, laborious job—one which the contractors will long remember because of the pock-marked foundation.

It was almost as difficult getting the impervious fill started, because the same tight places which posed so many problems in stripping required hand tamping with Gunderson-Taylor Triplex guns to get the fill level back up to where sheepsfoot rollers could do their work. It was also necessary to install the core wall and grout cap before impervious fill could start back up. The dam is well instrumented. Piezometers were installed, along with their control wires, before fill really began to move in large quantities.

During the first year, impervious material for Zone 1 was brought in from a small, shallow borrow area close to the damsite. The pit contained only enough material, however, to keep the operation rolling until the end of the first year.

The 1958-59 construction operations on the various zones can best be described by taking a visit in turn to each zone and the borrow pit which supplies it with material. For the first part of this field trip then, let's take a look at Borrow Pit A which supplies impervious clay for Zone 1.

Borrow Pit A is located 1,500 feet above the dam, and about three miles distant on the top of a high plateau or ridge. The pit is not perfect. Bureau of Reclamation engineers like to see Zone 1 material check out from 38 to 40% retained on the No. 4 mesh screen; the rest made of fine clay particles which pass the No. 4. Extensive blending has been necessary in the pit, but it has been done well, and material meeting the specifications right down the middle has generally been delivered to the fill.

Some of the material in this pit consists of a very soft claystone rock which breaks down readily after equipment loads it. In its natural state, however, it requires heavy ripping. This work is being done by a D9 and a D8. One machine is equipped with a Caterpillar ripper frame, the other with an Ateco. At the present time, the contractors are using Saber Tooth ripper shanks and points. These two rippers break up the harder parts of the formation ahead of the scraper loading fleet.

The scraper loading fleet averages nine

Caterpillar DW20's, which are serviced in turn by four D9 pushers. Usual procedure in loading the DW20's is to double push with two D9's. Excellent loads are being picked up by this method, and hauled and dumped into two pit-loading stations. These huge stations have drive-through tracks and heavy-duty grizzly bars which drop the material through to large bins below. The capacity of these bins is from 40 to 45 loads.

The pit-loading stations are served by Link-Belt feeders which send the material on a common conveyor to a large screening and crushing plant, where heavy-duty Tyrock screens separate the oversize.

(Left) Checking of every load that leaves borrow pit helps contractor improve production. (Right) An electrically-powered dragline pulls gravel out of underwater pit.

Carries to Dam

As the crushed material comes out from the plant, it rejoins the other fines, and a beautiful blend of material is then put on the 12,000-ft. conveyor belt, which carries it down toward the dam. This conveyor belt consists of Barber-Greene troughing and return idlers, a 42-in. Goodrich conveyor belt, and Link-Belt pulleys, frames and take-ups. There are nine flights, equipped to deliver about 1,400 cubic yards per hour under average conditions. Five flights pass down a slope so steep that the electric motors which hold back the load develop about 300 horsepower each—or a 1,500-hp total.

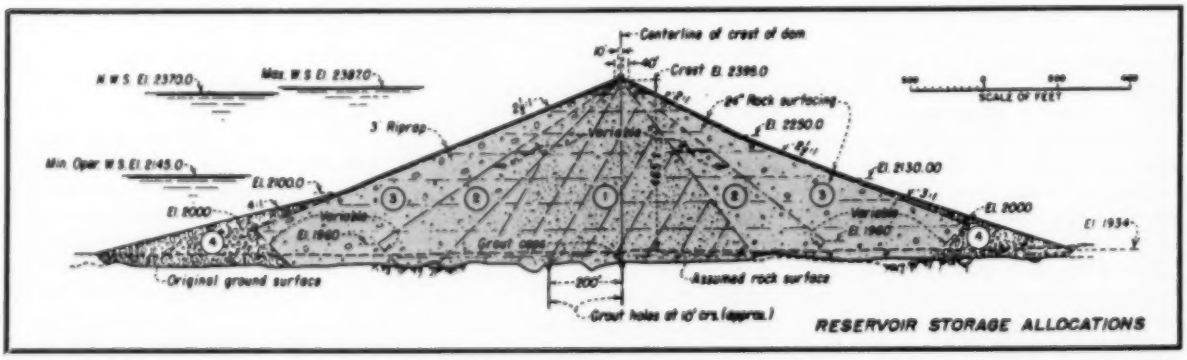
This power is fed back for use on other parts of the enormous construction load, and Trinity Dam Contractors therefore get credit for the power generated by using it in that way. Some power also is used on fans which have a steady braking effect on the downhill flights.

An impressive plant has been built at the discharge end of the conveyor system. It consists of three automatic bins of 500 cubic yards capacity each, so fully automatic that the plant operator scarcely ever touches a thing. There's even an automatic water injection system in the form of a ring spray at the top of each bin, which automatically puts in exactly the right percentage of moisture required by U. S. Bureau of Reclamation inspectors. Husky 12-in. air rams operate fast-opening gates at the bottom of the main bins. These big gates, in turn, permit a predetermined amount of material to drop down into a combination bin which weighs, holds and discharges the material to hauling units underneath.

When one of the hauling units moves into position underneath the bins, a signal cuts an electronic beam when the machine gets exactly into the right position. The dump gates on the weigh bin automatically open, discharging 45 tons of material into the hauling unit. As soon as the machine pulls out of the way, the electronic beam, again undisturbed, causes the weigh bin gates to close, after which time the gates in the upper bin open to send down more material. The system is so foolproof that no wrong operation is possible. In other words, the gates for the upper bin cannot be opened while a load of material is being dumped into a hauling unit. The whole thing is controlled beautifully.

Caterpillar DW20's are being used to haul material from the conveyor terminal building to Zone 1. These machines were built up with sideboards by Peterson Tractor & Equipment Co. of San Leandro, Calif.

Down on the fill, Zone 1 material is



Dam embankment contains four zones of materials. It is nearly a half-mile wide at its base and is 465 feet above streambed.

(Above) Here's an idea of the digging power of the heavy 7-yd. bucket carried by the 150-B dragline. Gravel and cobbles are pulled up from about 15 feet below waterline.

dumped in 6-in. lifts with precise moisture control, thanks to the automatic moisture injecting idea. Specifications require 12 passes of special sheepsfoot rollers which weigh a minimum of 4,700 pounds per linear foot of roller.

To reduce the number of passes to six, the contractors are using two double-drum sheepsfoot rollers behind D9 tractors, and in cases where a single roller is used behind a D8, the full 12 passes are made. In addition to the rollers, there are two tractors with scratcher bars and dozer blades on the fill, a water-wagon for putting on small final increments of water, and a No. 12 motor grader for lift dressing.

The entire Zone 1 Borrow Pit A operation is well serviced by excellent haul roads, sprinkled by waterwagons to control dust. There is a No. 12 motor grader in Borrow Pit A, and its haul roads are kept beautifully smooth as are all haul roads throughout the project. The 3,000-gallon water tank truck keeps dust down on haul roads in such a way that operations are speeded, tires are operated with the least amount of wear, and the whole job is made as safe as possible.

Zone 2 consists of a heavy buffer strip of material, which rests on either side of Zone 1. In other words, Zone 2 is a bulwark which protects the flanks of Zone 1. It is a relatively free-draining zone, but it also furnishes some material which is impervious. Contractor's men call it a "catch-all" zone, which stops at approximately elevation 2200. All told, there are 2½ million cubic yards of material in this zone, about 2¼ million yards of which will come from the large slide on the left abutment.

Equipment for excavating Zone 2 material is approximately the same, and the operation also is about the same as was previously described for Borrow Pit A. Caterpillar DW20's are being used in this pit with D9's for double pushing. The same double pusher system of loading scrapers puts excellent loads on the fill at high speed.

Compaction specifications for Zone 2 are more lenient, and moisture control is not so fine as it is in Zone 1.

Biggest Zone

The 13,400,000 yards of material making up Zone 3 form the biggest single block of material in the dam. Zone 3 is split evenly on both sides of Zone 2, one-half the yardage going upstream; the other half downstream on the impervious core. Specifications for Zone 3 material call for a combination of gold dredge tailings, dredge screenings, and undredged sand and gravel. Dredge tailings are being obtained from excavation for permanent construction and from borrow areas B and C. Dredge screenings are being obtained from the excavation for permanent construction and from excavation for minimum channel requirements in Borrow Area B. A great amount of undredged sand and gravel also is being dug from Borrow Area B in the reservoir area above the dam.

The contractors purchased new some large equipment for moving this material. In Borrow Area B, below the dam, there is a Bucyrus-Erie 150-B dragline swinging a 7-yd. perforated bucket. Under this machine are eight 30-yd. Southwest scrapers pulled by Mack tractors. Haul roads are kept polished by two No. 12 motor graders, and dust is kept down by a waterwagon. Dust, however, is not too serious a problem on this road since the dragline frequently excavates below water level, and the loads drip moisture.

In Borrow Area C, where extensive

General Supt. Joe McNabb (right) shows satisfaction with progress of the job as he chats with USBR representative.

piles of dredged tailings lie, a Bucyrus-Erie electric-powered 150-B shovel is working with an 8-yd. Esco lightweight dipper. Twelve Southwest dump-trailers are being used here behind International Payhaulers and an occasional Euclid tractor. As in the case of the previous 150-B, a D8 Caterpillar services the pit floor area.

In addition to this excavation, a 120-B shovel with a 6-yd. dipper is being used just below the berm in another tailings area. Euclid 14-yd. 63-TD's are working with this machine, end dumping their loads on the fill.

Processing of Zone 3 material is even more lenient. USBR specifications call only for tractor rolling by a 40,000-lb. tractor. To meet this requirement, there are several D8's on the fill spreading and rolling, along with a D9. This equipment handles the fill as it is dumped at high speed.

The 2,200,000 cubic yards which make up Zone 4 and another 300,000 cubic yards of rock rip-rap and surfacing for wave action, are the products of a quarry operation. Good rock is located above the dam on the left abutment. The main bulk of rock, however, has come from the quarry over the left abutment.

It was very important during the 1958 season to get the heavy bulk of rock fill in at both toes by the end of the season. To do this, production was set up on a basis of 12,000 to 13,000 cubic yards per day, and two large shovels were assigned to rock production.

Now that the big bulk of rock production is out of the way, the remainder of this material can easily be handled this year by a 3-yd. 71-B. Euclid 63-TD's are hauling from this unit. Later on, even the 71-B will be too large, and a smaller unit will be pressed into service.

This mountain roller coaster brings crushed rock and clay from borrow pits high in the hills. There are nine flights to the 42-in. conveyor, which is 12,000 feet long.

TRINITY DAM

Type: Earth, sand, gravel and cobble fill.
Height above streambed: 465 feet.
Crest elevation: 2,395 feet above msl.
Crest length: 2,450 feet.
Volume of embankment: 33,180,000 yards.
Spillway: 20-ft. diameter.
Spillway capacity: 24,000 cfs.
Outlet works capacity: 4,970 cfs.

TRINITY RESERVOIR

Gross storage capacity: 2,500,000 acre-ft.
Active storage capacity: 2,160,000 acre-ft.
Inactive storage capacity: 340,000 acre-ft.
Normal w. s. elevation: 2,370 gross storage capacity.
Maximum w. s. elevation: 2,387 feet.
Area of gross storage capacity: 16,400 acres.

TRINITY POWER PLANT

Number of units: 2
Capacity of units: 48,000 kilowatts each.
Turbine ratings: 66,800 horsepower each.
Design head: 375 feet.
Discharge per turbine: 1,850 cfs.

Reuse Bits

Drilling has all been done by Joy down-the-hole drills, using 40 feet of steel and 4½-in. diameter Brunner & Lay Rok-Bits. A feature of this year's drilling is the fact that many of last year's bits, now worn down to 3½ inches in diameter, still are giving good service. Hole centers are being drilled on a 12x12-ft. pattern, and are carried down several feet below the level of the quarry floor. Last year when the shot rock was being loaded by larger shovels, four rows of holes were shot at one time. This year, however, two rows are shot.

Loading consists of carbo-nitrate powder in 8x50-lb. bags. The ammonium nitrate is set off by 40% special gelatin primers, placed mostly at the bottom of the hole. One or two sticks of gelatin are placed in each hole as a booster charge, farther up. Detonation is by Atlas Rockmaster caps, using delays to achieve a piling effect. This also gives considerable secondary breakage.

Ted McDaniel, veteran powder superintendent, has developed several tricks of his own which work well. It is fairly easy, for example, to plug the air channel holes of Joy drill steel with drill cuttings. When that happens, McDaniel uses small-diameter Primacord which he

Joy drills work high on a quarry face as a powder crew loads holes in the center and a shovel bails the last of a previous shot.

shoves down the drill steel hole to the point where the cuttings are plugged up. The Primacord then is set off and invariably clears the steel. He has also experimented to a small extent using Series 400 Primacord in 1-ft. chunks for secondary breaking of oversize boulders.

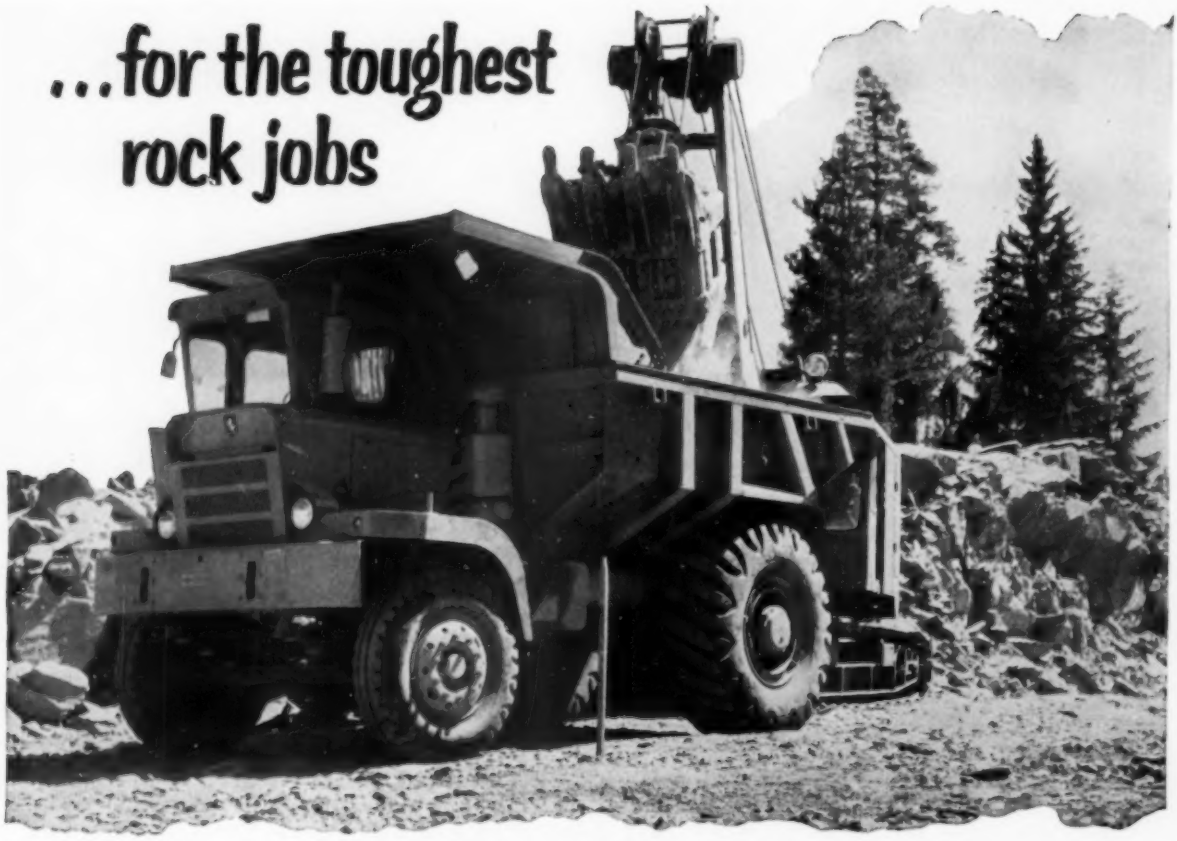
Zone 4 material, after being dumped, is processed only by one D8 tractor, whose bulldozer levels the material while the weight of the tractor compacts it to some extent. This is a completely free-draining zone, however, so compaction specifications are not rigid.

The entire production of material for all four zones added up all over the dam amount to the 80,000 to 90,000 daily yards of production which Steiner must have if the dam is to be finished on his schedule of 1960. Things are rolling smoothly now, however, and all indications point to the fact that this schedule will be met successfully. Ten new Euclids will have been delivered by the time this is published. Thanks to good men, good equipment and a good work program, 1959 should be Trinity Dam's big year.

Assisting Project Manager Steiner are Joe McNabb, general superintendent, with Ernie Ford as equipment superintendent.

An important construction job downstream from Trinity Dam is a 10-mile long hydro power tunnel. This Northwest shovel is facing off the excavation at the inlet portal.

...for the toughest rock jobs

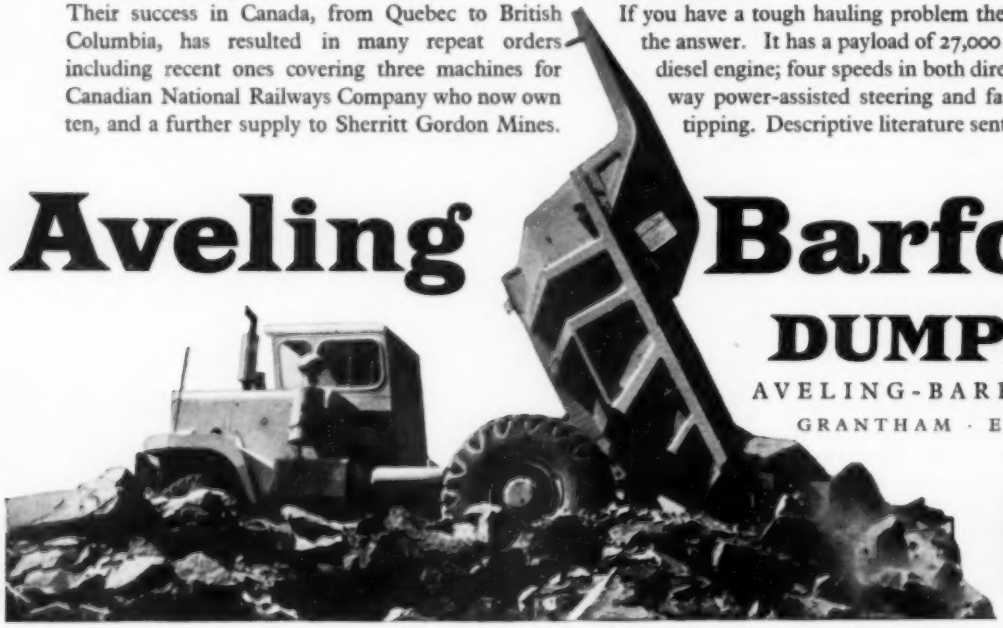


In quarries, mines, tunnels and on big construction projects all over the world, hundreds of Aveling-Barford "SL" Dumpers are handling the toughest of off-road haulage jobs.

Their success in Canada, from Quebec to British Columbia, has resulted in many repeat orders including recent ones covering three machines for Canadian National Railways Company who now own ten, and a further supply to Sherritt Gordon Mines.

Another success is a repeat order for ten "SL270" Dumpers for Canadian Foreign Ore Development Corporation Limited. This brings their fleet strength to 20 machines.

If you have a tough hauling problem the "SL270" is the answer. It has a payload of 27,000 lb., 163 h.p. diesel engine; four speeds in both directions; two-way power-assisted steering and fast hydraulic tipping. Descriptive literature sent on request.



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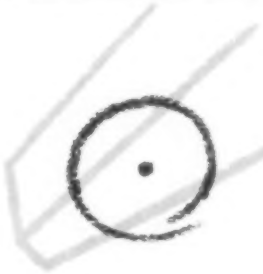
12M ALLOY STEEL

ESCO 12M Points are the toughest you can buy. Developed through years of research for the construction industry, cast *ESCO* 12M is carefully heat treated to produce the finest steel made for the severe shock and abrasion encountered by points and adapters.

RIGID QUALITY CONTROL TESTS ASSURE TOUGHNESS, HARDNESS



Every *ESCO* Point is Brinell tested to assure the exact degree of shock-absorbing toughness and abrasion-resisting hardness for longer digging life. Be sure to look for the Brinell mark on every *ESCO* Point you buy.

8 POINT SHAPES

You can select from eight different shapes to find the point that matches your digging conditions. *ESCO* Points are designed by bucket and excavation specialists who know how to achieve top digging performance. The self sharpening design of an *ESCO* Point makes it start sharp and stay sharp.

ESCO Points and Adapters for all digging equipment

Your local ESCO dealer can supply Points and Adapters for all your digging needs. By using ESCO Points and Adapters on all your equipment you can cut costs further by reducing your point inventory and consolidating purchases. Call your ESCO dealer today for details. He's listed in the yellow pages of your telephone directory. Or, write direct.

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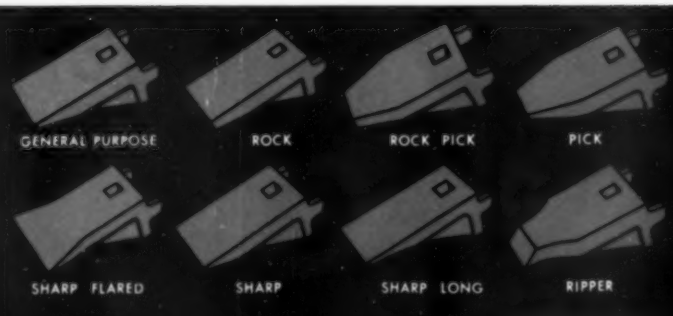
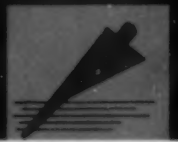


ESCO Point shapes start sharp, stay sharp and last longer under any digging condition.



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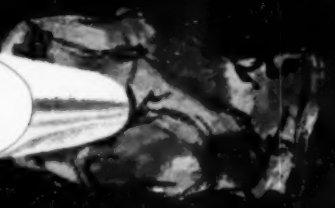

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many times, many ways

"... five times the footage as the blast hole drills previously used."

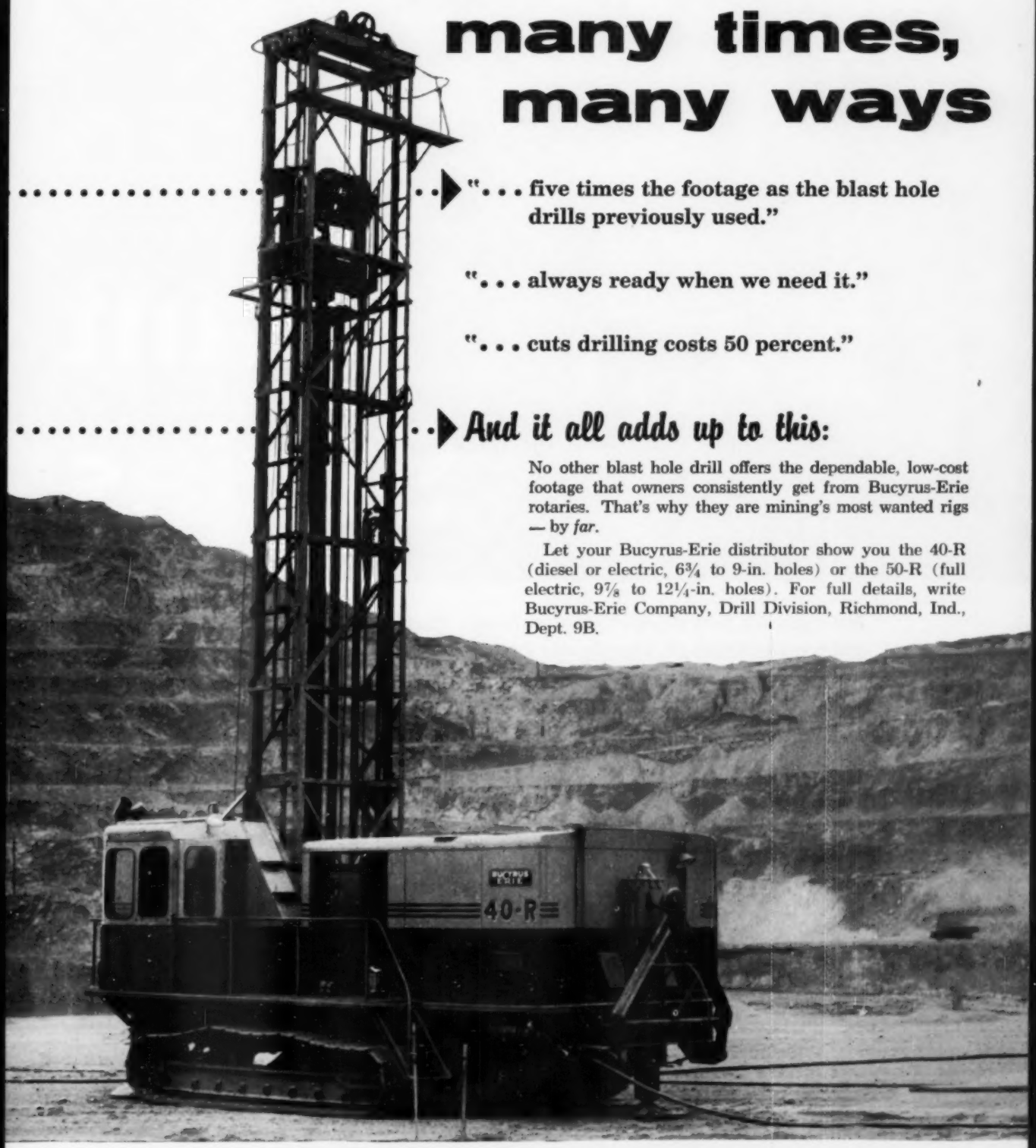
"... always ready when we need it."

"... cuts drilling costs 50 percent."

And it all adds up to this:

No other blast hole drill offers the dependable, low-cost footage that owners consistently get from Bucyrus-Erie rotaries. That's why they are mining's most wanted rigs — by *far*.

Let your Bucyrus-Erie distributor show you the 40-R (diesel or electric, 6¾ to 9-in. holes) or the 50-R (full electric, 9⅞ to 12¼-in. holes). For full details, write Bucyrus-Erie Company, Drill Division, Richmond, Ind., Dept. 9B.



BUCYRUS ERIE®

Builds Better Equipment

Giant Series

New power! New design! New features! Plus a new drive option—Cat power shift transmission! The result: higher production on any application!

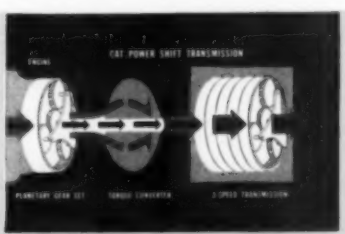
Now the "King of the Crawlers" is better than ever with new pace-setting capacity for higher, faster, lower-cost production on *any* big tractor application!

The biggest "new look" in the giant D9 Series E is the undercarriage. It's more massive . . . more rugged than ever. It'll add hours of life to running gear on even the toughest jobs. *Every* track component is new in design, highlighted by a big, new link—its pitch is increased 1¼" to 10¼"! And a new Caterpillar-developed steel alloy strengthens links, shoes, rollers *up to 40%!*

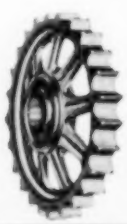
That's not all: the new D9 packs more power—335 HP. Its new equalizer bar gives greater stability on any terrain for greater operator confidence and production. A wider seat with a new spring-loaded adjustment mechanism makes the operator more comfortable, more efficient. No detail has been overlooked to make the new D9 handle heavier loads faster—and at lower operating and maintenance costs than ever.

And that's not all. Now, along with direct drive and torque converter, you have your choice of the new Cat

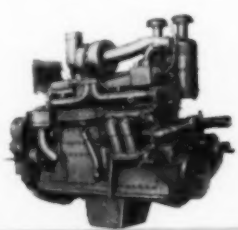
Dry-type air cleaner. Removes at least 99.8% of all dirt from intake air during every service hour. Can be serviced in 5 minutes. Reduces maintenance time and cost.



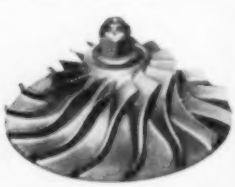
Exclusive feature. A planetary gear set splits the power from the engine. Part goes directly to the 3-speed transmission, the rest goes through a torque converter to transmission.



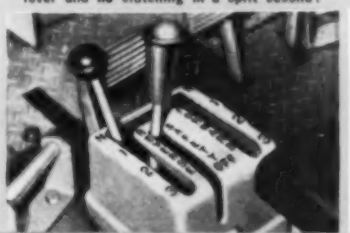
New sprocket. Sprocket is strengthened by new design with increased tooth thickness. Hunting tooth action provides slower wear rate.



New 335 HP. More powerful than ever, the D9's Turbocharged Engine has the capacity to handle bigger loads faster, with dependability, economy.

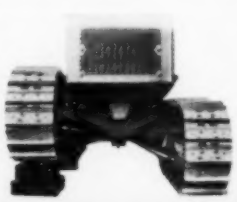


New Turbocharger. New, compact turbocharger packs more air into the engine. Open impeller wheel (shown below) helps prevent dirt build-up.



New power shift transmission. Optional on the D9. With this development you can shift **on-the-go** under **full** load with **one** lever and **no** clutching in a split second!

New, bigger, more rugged undercarriage. Major improvements in all track components add hundreds of hours of life to running gear—hours that mean more time on the job.



New equalizer bar. Greater stability. The rocking action of the bar shifts more weight to the up-hill track.

new CAT D9 E Tractor

power shift transmission. This revolutionary transmission, tested under the most rugged conditions, combines for the *first* time the positive feel of direct drive with the flexibility and anti-stall features of torque converter. With one control lever and no clutching, it reverses direction . . . changes speed . . . smoothly . . . under full load . . . in a split second!

Many of the new features, along with some familiar retained features, are shown here. Look them over. They'll give you an idea *why* the new D9 can mean higher production and more profits for you. For complete facts, see your Caterpillar Dealer. Ask for a demonstration and watch this giant eat up the work!

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

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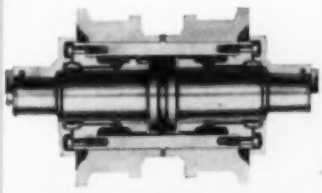
NEW D9 SERIES E— BORN OF RESEARCH PROVED IN THE FIELD

New track link — Previous track link

Light area at top indicates depth of hardening

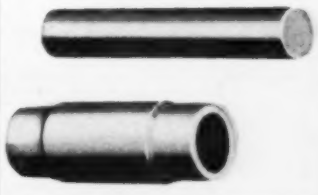
New deep hardening steel. Caterpillar-developed steel alloy (plus more steel in stress areas) gives up to 40% longer life to track shoes, links and rollers.

Better visibility. Redesigned fuel tank gives better visibility to the rear and tapered hood offers unexcelled forward vision.



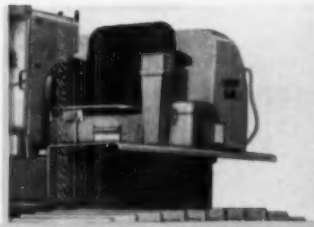
Lifetime lubricated track rollers. Lifetime lubrication eliminates servicing problems. Oil is retained by dirt-proof, floating-ring seals.

Stronger track shoes. New alloy permits deeper hardening in wear areas. Grouser height is increased ⅜" for better penetration and prolonged service life.



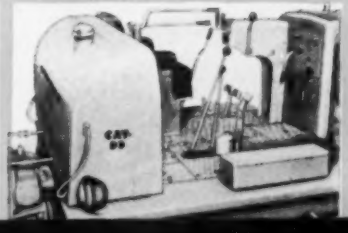
Larger pins and bushings. Diameters are ¼" larger. Increased size reduces deflection and provides better contact along the length of the wear surfaces.

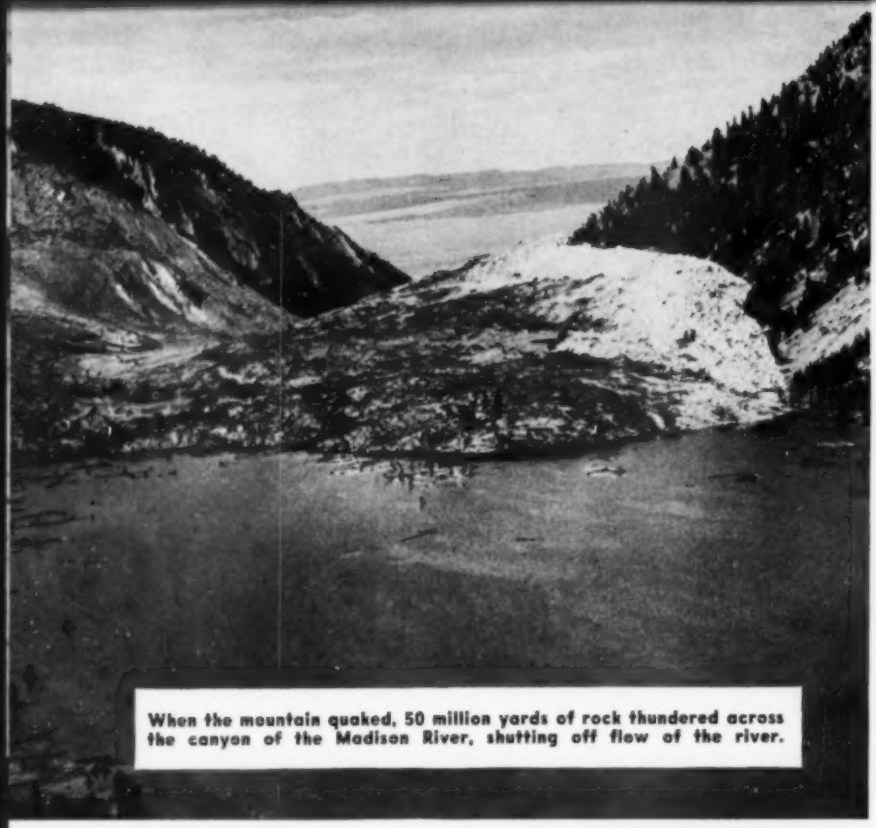
New foot decelerator. Provides easier machine positioning. Allows deceleration without taking hands from controls (optional on direct drive, standard on others).



New seat adjustment. New spring-loaded adjustment mechanism provides more positive cushion and back rest positioning. Wider seat for more comfort.

Bigger, heavier track links. Strength has been added in stress areas. Pitch increase from 9" to 10¼" strengthens all track components.





When the mountain quaked, 50 million yards of rock thundered across the canyon of the Madison River, shutting off flow of the river.

(Above) Big dozer fleet quickly levels off the crest of the giant rock plug.

Earthmovers

EIGHT Montana contractors rushed men and excavating equipment to thwart a threatening flood following the devastating August 17 earthquake that dumped 50 million yards of shattered mountain top into the Madison River Canyon seven miles below Hebgen Dam. A spillway had to be cut before the rising waters crested and started a runaway washout.

H. G. Hutchins, chief of construction, Garrison (Dam) District, Corps of Engineers, estimated 200,000 yards of pulverized rock would have to be moved to cut the 16-ft. deep, 150-ft. wide spillway, on a 7% slope down the face of the big plug. The crest will be about 175 feet above streambed when the work is completed.

(Above) Some 200,000 yards of rock are moved by dozers to open up a 16-ft. deep and 150-ft. wide spillway to carry the rising waters over the newly-formed dam.

Emergency road, which bypasses a portion of state highway 1 erased by slides, is cut through by equipment pulled off a nearby highway job by Naranche & Konda Co.

Contractors Arrive

Some 23 crawler tractors were hurried to the disaster area. F&S Contracting Co., Butte, was the first contractor to arrive at the site on the 24th, and immediately put two of its six Caterpillar D8's to work pioneering an access road over the slide to the spillway area. Work started on the spillway August 26, with the full complement of 23 crawlers on the job by noon next day.

In addition to the spillway work, the tractors leveled the crest for 1,000 feet. Approximately 50,000 yards of dolo-

Aftermath of an earthquake is this battered stationwagon. At least 29 persons disappeared in the debris of slides and 200 more were cut off temporarily by slides.

Pitch In at Montana Disaster Site

mite riprap were placed in the spillway by a fleet of end dump trucks, loaded by two 2-yd. shovels working out of a pile of rock pushed 300 feet up the far side of the valley by the thundering slide.

Hutchins hoped to have all the work done by September 5, before the water filled the reservoir. Since no accurate stream flow data was available, he said, "It's anyone's guess when the lake will fill." The basin can hold an estimated 80,000 acre-feet of water.

Earlier, another Montana roadbuilding contractor aided survivors of the disaster in evacuating the area.

The night the mountain fell, more than 20 persons disappeared. Aftershocks continued to shake the hills for days.

Most of the damage occurred along the Madison River in Gallatin national forest. The quake knocked the top off an 8,000-ft. mountain, blocking the river seven miles downstream from Hebgen Dam with approximately 50 million yards of rock and earth piled about 200 feet high, a mile long and a half-mile across the canyon. Most of the casualties were caused by this slide.

A fissure for some 20 miles along the north side of Madison River caused the land to sink from 6 to 15 feet. Cracks opened up in the earth-fill dam, but, despite early fears, it held. Four sections of Highway 1, which runs through the canyon, sunk or slid into Hebgen Lake, bottling up 200 campers and tourists between the big slide and the broken road. Steep hillsides (1½ on 1 grade) lined the slide sections.

At the time of the quake, Naranche & Konda Construction Co., of Butte, was grading 9.7 miles of U. S. highway 191 in Gallatin Canyon, 35 miles away. At 5 a.m. on August 18, the contractor received a call for help to punch an emergency road around the slides along Hebgen Lake. Two Caterpillar DW20- No. 456 and one DW21- No. 470 tractor-scrapers and two No. 12 motor graders sped off to the scene, while three D8's were trucked in. By mid-morning the D8's were pioneering an emergency road high up the hillsides to avoid more sliding, with the ground still quivering with after-shocks.

By 7:30 p.m., almost two miles of road had been opened up, and 50 carloads of survivors streamed out.

On the 20th, A. F. (Tony) Konda, proud of the job his men and machines had done, was back at work in Gallatin Canyon.

Shaken by a severe earthquake, this hillside slid into Hebgen Lake, carrying several hundred feet of Highway 1 and a cabin with it. The area is near Yellowstone.

Ex-Laffs

by Roesler

"Hey!"
U-13
"WAIT UNTIL WE GET ASHORE BEFORE YOU TRY OUT THAT CORE DRILL!"
ABC CONST. CORP.
"WHAT'S SO UNUSUAL ABOUT A DOG TREEING A 'CAT'?"
"THERE'S BEEN A FOUL-UP ON THAT FLOOD-CONTROL PROJECT."
ARK
"NO FANCY GOLD FILLING IN THAT BUCKET TOOTH, DOC.- JUST SOMETHING DURABLE."
"WHAT'S SO DIFFICULT ABOUT MAKING A SIMPLE, LITTLE, AIR-COMPRESSOR CONNECTION?"
"ANY DARN FOOL CAN SIGN HIS NAME IN HIS CEMENT WORK!"

EXCAVATING ENGINEER

Virginia Stripper Moves Mountainsides

Twin-engined TC-12 dozes dirt off cliff edge as it works to expose seam of coal. One of stripping problems is finding adequate area for spoiling waste overburden.

HIGH in Virginia's Cumberland Mountains, large amounts of overburden are being moved daily to uncover two seams of bituminous coal. This earthmoving is part of a combined contour stripping-auger mining operation run by the Stamack Mining Corp., Wise, Va.

The Stamack firm is a mining contractor, presently working on land near Appalachia, Va., which yields a product containing 5 to 10% ash. The coal is sold to power plants throughout the southeast and to the Tennessee Valley Authority, where it is used to produce steam for turning TVA's giant turbines.

Stamack Mining Corp. uses bulldozers and medium-sized power shovels to move overburden from two seams of soft coal in contour stripping operation. Machines do their job efficiently.

Blasted rock is cast into piles by torque converter-equipped 3-yd. shovel digging against highwall. Wall is kept as vertical to its toe as possible to facilitate augering.

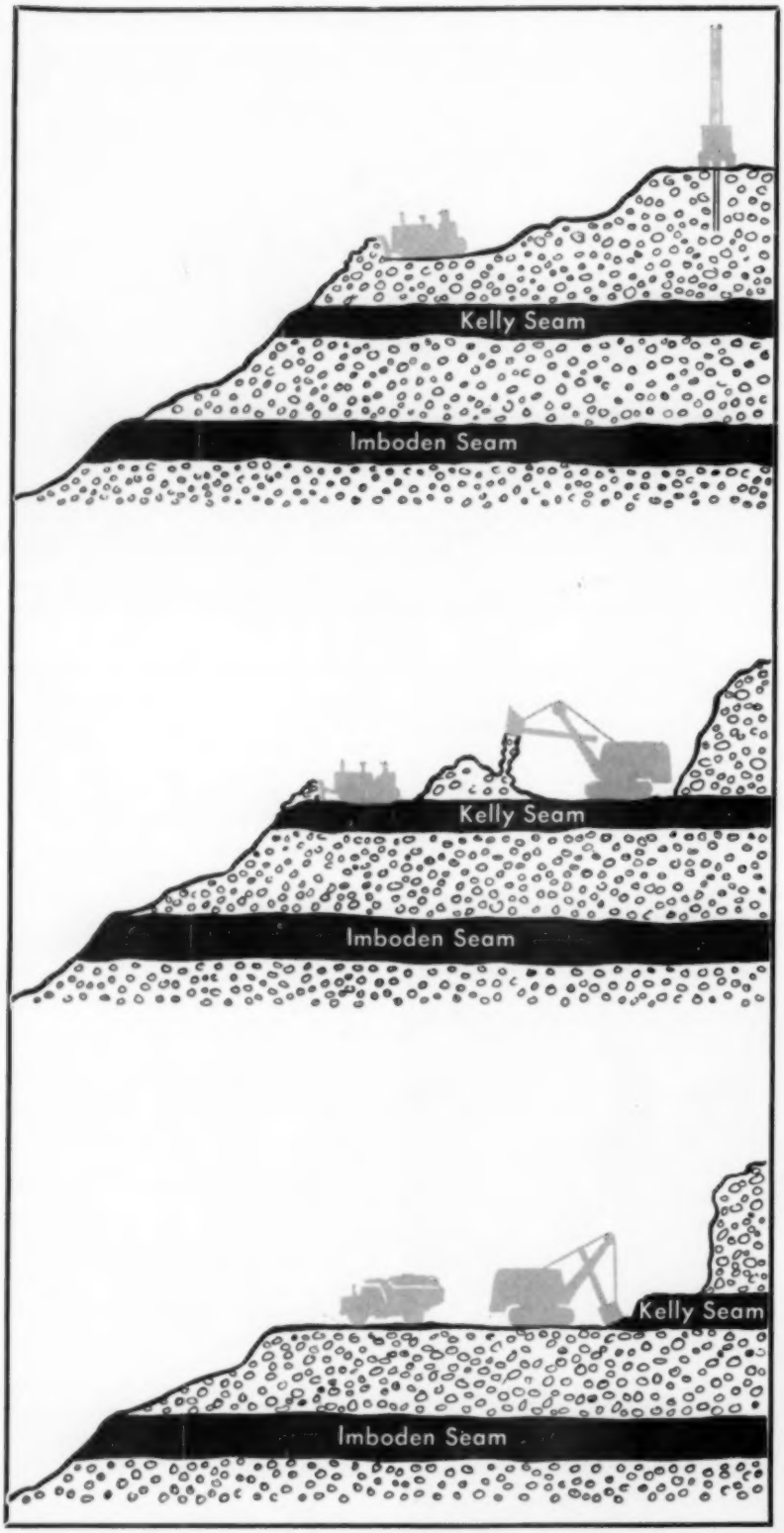
Stamack crews have been stripping and augering the Appalachia area for the past two years, moving some five million yards of earth along a 4½-mile stretch of mountainous terrain during that time.

Operating Procedure

The contour stripping part of Stamack's operation is characterized by bulldozers and medium-sized power shovels moving large quantities of overburden quickly and efficiently. Stripping follows these steps:

1. Removing overburden from the Kelly seam, which runs up to 3½ feet thick.
2. Loading out the Kelly coal.
3. Removing overburden from the Imboden seam, which runs up to 10 feet thick.
4. Loading out the Imboden coal.

To remove overburden from the Kelly seam, the bulldozers first push all loose material from the outcropping of coal off the mountainside. Other dozers, meanwhile, bench down an area above so a big vertical rotary drill can be brought in to prepare powder holes for blasting. After a shot is made, the power shovels cast the broken rock and earth into piles which the dozers quickly spoil over the mountainside, straight back



To remove overburden from Kelly seam, bulldozers first push all loose material from an outcropping of coal off the mountainside. Big rotary drill works on benched-down area above to prepare powder holes for blasting. Stripping shovels cast broken material into piles from which dozers can quickly spoil material over mountainside, straight back from face of highwall and beyond the crop of coal. Shovel then loads coal out of Kelly seam. Stripping is done in much the same way on Imboden seam.

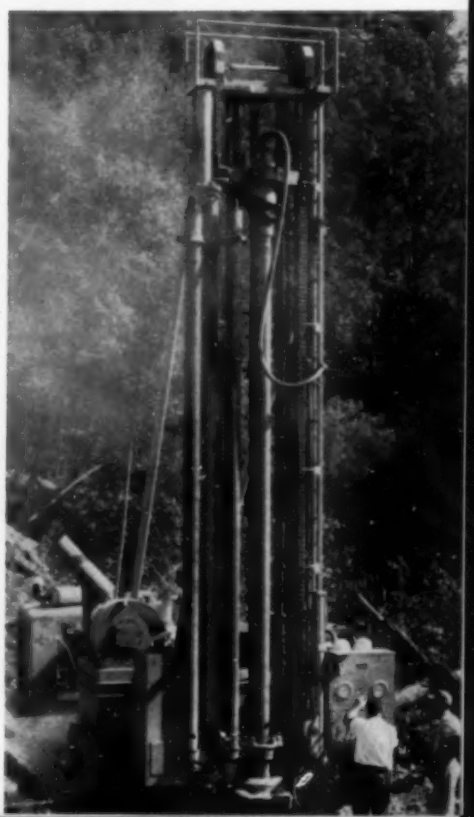
from the face of the high wall and beyond the crop of coal.

When overburden has been removed from and the coal has been loaded out of the Kelly seam, Stamack puts its equipment to work on the Imboden seam, where stripping is done in much the same manner as on the Kelly seam. Dozers push loose material off the mountainside; the rotary drill prepares holes for blasting; power shovels cast the broken material into piles; dozers spoil the waste over the mountainside.

The distance overburden is cut back on a seam of coal in the stripping operation depends on various factors. These include the nature of the overburden, the cost of removing it, the size of a coal seam and spoil area available. Where conditions are favorable, the overburden highwall will extend upward 80 feet from the toe of the Imboden seam, exposing 100 to 125 feet of Imboden coal. Overburden is seldom cut back beyond this point because excavation costs will usually exceed the value of the coal.

Although hauling overburden to offsite locations is necessary in cases where spoil area is not available at the mining site, it is generally not practiced by Stamack. It is justifiable when the amount of coal produced is great enough to more than offset hauling costs.

Robbins R10 rotary prepares powder holes in overburden with 9-in. Hughes jet bits. Drilling depth averages 55 feet.



This 5½-yd. diesel-powered shovel is Stamack Mining Corporation's biggest stripper. It handles some 700 yards of material an hour.

The Stamack firm uses a large Robbins R10 rotary drill to prepare blast holes in overburden covering both the Kelly and Imboden seams. It puts down 9-in. holes on 22-ft. centers to an average drilling depth of 55 feet. It is mounted on the rear of an International TD-24 tractor and gets its air supply from an Ingersoll-Rand 600 Gyro-Flo compressor rigged to the tractor's front. The rotary bores about 17 holes in an eight-hour shift with Hughes jet bits that are replaced after 3,500 feet. The R10 is not worked continually because it can put down enough holes in a week to shoot twice as much overburden as machines on the job can handle.

Blasting takes place every two to three weeks. Ammonium nitrate fertilizer plus 5x12-in. stick of Atlas, Hercules or duPont 60% gelatin-type dynamite are loaded into 45 to 50 holes.

Each hole is filled with approximately 550 pounds of the nitrate. DuPont caps and Primacord detonate the shots. Amounts of overburden brought down by the blasts vary. Some shots have produced as much as 3½ acres of broken material, according to estimates of Stamack officials.

Power shovels assigned to cast the blasted rock and earth into piles include a 5½-yd. Lima model 2400 diesel, a 3-yd. Lima model 1201 and a 3-yd. Bucyrus-Erie 71-B. Combined, these machines handle some 1,400 yards of material an hour.

"Experience has shown us that three or four medium-sized shovels working in a given area do the stripping job more quickly and efficiently than can one or two larger machines," said lean, ambitious and congenial Jim Stallard, who heads the Stamack firm.

Lack Space

"We must work within a relatively confined space on the mountainside, where it would be difficult for the larger shovels to maneuver. Getting them up to the stripping sites would be real time consuming, if not next to impossible, because of the rugged terrain. As it is, we sometimes have considerable difficulty moving the smaller shovels to where we want them.

"We've also tried other methods of removing the overburden from the seams of coal, such as with scrapers, but have found that bulldozers working in conjunction with the medium-sized shovels provide the best method," Stallard said.

Dozers that spoil the material over the mountainside include twin-engined Euclid TC-12's, Cat D9's, International TD-24's and Allis-Chalmers HD-21's.

The 3-yd. shovels almost always work

Auger bores up to 180 feet in mountain. Coal is wormed into Haiss portable conveyor, which loads end-dumps. Holes are later blocked with dirt to prevent brush fires.

against the face of the highwall, which they try to keep as vertical as possible so the auger mining can be carried on in maximum safety.

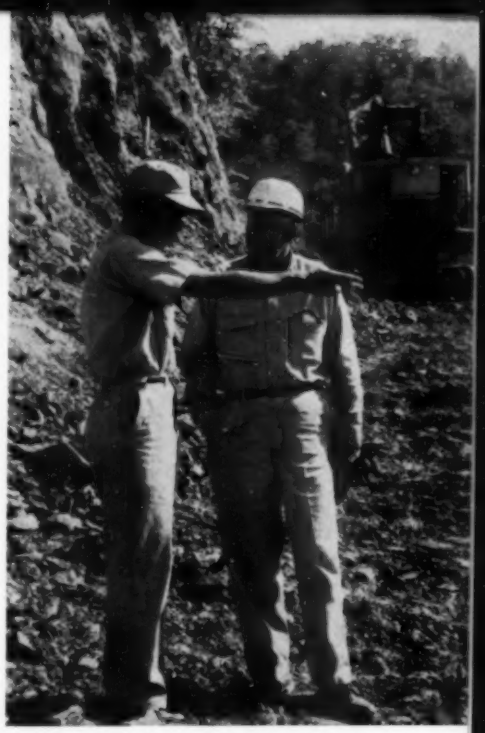
Before coal is loaded out of a seam from which the overburden has been removed, the seam is cleaned with a 2½-yd. Michigan model 175A front-end loader. A 2½-yd. Northwest 80-D then moves in to load coal from the exposed seam into miscellaneous end-dump trucks of about 10-yd. capacity owned by B. W. Jessee, Dryden, Va., who holds a hauling sub-contract. These trucks cover distances from one-half to two miles to empty into a 100-ton hopper or dump on stockpiles nearby.

A chain feeder, powered by a Reliance heavy-duty electric motor, spills the coal from the hopper to a 30-in. wide conveyor belt. The conveyor passes over an automatic ABC continuous weighing and totalizing scale, which keeps track of daily coal tonnage produced.

Traveling through a mine shaft entry, the conveyor empties into a tipple near Applachia, where slate and other impurities are picked out. The coal is then crushed to 2-in. size and loaded into railroad cars for shipment.

Increase Output

To increase coal tonnage output and add flexibility to its stripping operation, the Stamack firm practices auger mining on a large scale basis. When overburden has been removed from and coal is loaded out of the Imboden seam, a 42-in. McCarthy auger moves up to the face of the highwall, boring to a depth of 180 feet into the Imboden seam.



Jim Stallard (pointing) discusses stripping problems with V. R. (Jack) Womack. They head up the Stamack Mining Corp.

(Above) Northwest 80-D swings 2½-yd. dipper of coal over a 10-ton end-dump while loading out exposed seam. (Below) Truck empties to hopper feeding tipple conveyors.

Coal from the auger, which has 12-ft. sections of 36, 40 and 42-in. diameter worms, is discharged into a portable Haiss conveyor, which loads the end-dump fleet. These in turn haul to the conveyor belt hopper or empty on stockpiles. Hole openings made by the auger's worm are later blocked off with dirt to eliminate the danger of future brush fires igniting the remaining crop coal.

In addition to the Stamack Mining Corp., Jim Stallard heads three other stripping-augering firms, which together form the biggest strip and auger coal producing combine in Virginia.

The parent organization is Stallard Brothers Co., founded 14 years ago. This company grew rapidly, and in time Stallard recognized the need for "more diversified control." He also had to have "more help in management" and wanted "new ideas in stripping methods" incorporated into his operation.

With an eye to achieving these ends, Stallard formed the Wisco Coal Corp. in November 1955. Elliott Clark, an experienced auger miner, was brought in the new firm as vice president and general manager. One month later the Stamack Mining Corp. was founded, bringing in V. R. (Jack) Womack, an expert stripper. The last firm organized was Stallard-Womack, and plans are being laid to establish another, to be known as Stallard-Lawson Corp., with D. R. Lawson as vice president and general manager.

Wisco Coal Corp. and Stallard Brothers Co. strip and auger for the Clinchfield Coal Co., Dante, Va. Stamack and Stallard-Womack strip and auger for the Stonega Coke and Coal Co. All work under separate leases. Stallard estimates that his four firms move between 75,000 and 80,000 yards of earth a day, producing 3,500 to 4,000 tons of coal.

Stripping and augering operations of the four firms are often spread over an area of 100 miles and more. Control is effected by tying all activities to headquarters at Wise with a two-way Motorola short wave radio hookup. Each of six 4-wheel drive Willys station wagons, driven by key personnel, has a sending-receiving set.

Widespread operations present a major problem in maintenance, so special emphasis is placed on preventive care. Oilers and operators make daily equipment checks, and every machine receives periodic chassis lubrication. Shovel dippers get regular hard-facings with Airco 91 self-hardening rod. Dipper teeth are built up with Amsco and Esco manganese wedge bar after they are worn down three to four inches.

Maintenance problems which arise are quickly reported to D. G. McNeece, chief mechanic. If the trouble is of minor nature, repair work is put off until a time when it will not interfere with a spread's high production schedule. If the trouble requires immediate attention, McNeece makes every effort to get that piece of machinery back into operation as quickly as possible.

Build Dipper

Under McNeece's direction, a special coal-loading dipper has been built in the field. Used on a Northwest 80-D shovel, it is lighter than the standard-type dipper, is flat across the bottom and has six teeth instead of four. About 3-yd. capacity, it can load a 20-yd. dump truck in half the passes a standard dipper takes.

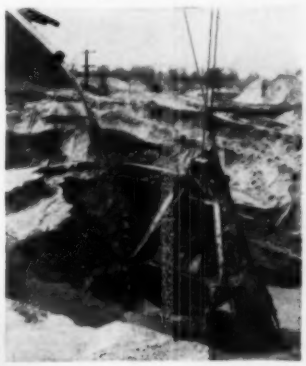
Key personnel in the multi-unit organization headed by Jim Stallard include his father, D. H. Stallard, who is secretary-treasurer and financial advisor of all four firms; D. G. McNeece, chief-mechanic; A. D. Arrington, auditor and office manager; Elliott Clark, general superintendent of Wisco Coal Corp.; V. R. Womack, general superintendent of Stamack Mining Corp. and the Stallard-Womack firm; and James Tomlinson, stripping superintendent of Stallard-Womack. The new firm of Stallard-Lawson will have D. R. Lawson as its general superintendent.

OWEN BUCKETS

new center line reeving doubles cable life

"Our new OWEN Bucket is great. That new center line reeving more than doubles our cable life," says Kenneth Muster, Supt. for R. F. Muntz, owner of the Hugo Sand and Gravel Co. of Kent, Ohio.

The tandem positioning of the lower closing sheaves permits the closing line lead to pass directly through the center of the head of the bucket. This exclusive OWEN feature eliminates excessive bending of the cable, resulting in increased cable life experienced by Hugo Sand and Gravel. It also permits the bucket to hang plumb from the crane boom.



"Our operation is tough on a clamshell, but all these improved OWEN features have greatly reduced our maintenance costs and cut down-time," claims Mr. Muster.

This OWEN Clamshell, with all moving parts lubricated . . . with all arm and sheave pins, plus the main shaft, having triple lip grease seals . . . has heavily cut the high maintenance expense of handling this sand suspended in water that comes directly from the wash plant.

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In open country west of Albuquerque, Cowart's efficient crushing plant produces aggregates for highway base and paving.

Malapai Rock for Highway Base?

by Floyd Suter Bixby

New Mexico contractor tackles crushing of West's hardest rock to rebuild U. S. 66.

GREAT things for motorists are being done in New Mexico. It was only a few years ago that New Mexico built its first few miles of four-lane highway, near Clovis. Today, with the federal-aid highway program in full swing, four-lane divided construction is commonplace all over the state.

One of the best contemporary examples is a six-mile $1,213,000 contract, which was recently finished on U. S. 66 about 20 miles west of Albuquerque by O. D. Cowart. The project is typical of New Mexico's current contracts. It called for 800,000 cubic yards of unclassified grading, production of 190,000 tons of sub-base rock and paving aggregate, all drainage features including reinforced concrete culvert boxes, and the finished plant-mix bituminous pavement.

Engineering-wise, the job met the very highest standards of the U. S. Bureau of Public Roads. Earth and sub-base compaction called for 95% modified AASHO density, and all fine rock—whether for sub-base or plant-mix aggregate—was produced by crushing rather than from gravel pit selection.

The sub-base was thick, too. Depending on the bearing value of the reddish, sandy subgrade, sub-base was constructed from 8 to 15 inches deep. It was topped by four inches of a 1-in. minus crushed leveling course rock. The plant-mix bituminous pavement, made with 85-100 penetration asphaltic cement, was three inches thick in two paving courses.

The only available raw material source was a solid lava flow deposit of malapai. And, since the malapai had to be gotten out in pieces small enough to pass the 3042 primary jaw crusher, Cowart was faced with the unique problem of how to do rock excavation efficiently, even though grading classified the job as a "dirt job."

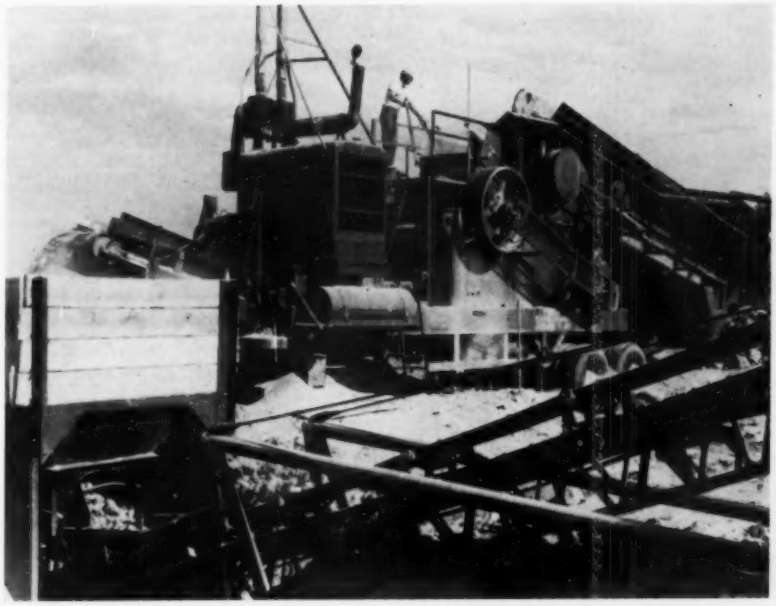
Since the job called for a nine month completion schedule, speed was vital. Several major reinforced concrete structures, to bypass or carry surface drainage through fills, were called for. These were completed as quickly as possible, so that grading really could move when it got under way. Along with construction of the newer, wider culverts, some old ones along the existing highway had to be destroyed. While this work was somewhat routine, its timing was precisely arranged to stay ahead of the main grading activity.

The culvert boxes were rectangular, and not fancy, so that prefabbed plywood form panels could be used over and over. These were manufactured by a carpenter crew, working in a small central yard with DeWalt and Skilsaw power saw equipment.

Although grading quantities were balanced, material hauls averaged well over 2,000 feet. Since most of the excavating was done in red, sandy material, it was an ideal job for fast rubber-tire tractor equipment. In fact, it was made to order for Cowart's fleet of six Euclid scrapers, which he brought in to the job shortly after the contract was awarded. For shorter haul work, and dressing finish material from the bottom of cuts, Cowart brought two Caterpillar No. 80 scrapers and a Caterpillar 463 scraper, pulled by D8's.

Auxiliary equipment around this spread included a Caterpillar No. 12 motor grader for leveling earth lifts; a 50-ton Tampo pneumatic roller pulled by a Euclid prime mover for earth compaction; a double set of sheepsfoot roller units behind a D8; a Cat D8 and D9 for pusher service; and water trucks for adding necessary moisture in the material. There was also a spare Cat D8 equipped

Heart of the primary crusher system is a Pioneer feeder and 3042 jaw unit.



with a front-end dozer and rear-end hydraulic ripper. It was used for loosening a few hard areas in borrow cuts, and for ripping up the old bituminous pavement.

Under average conditions, this fleet of grading equipment moved about 800 cubic yards of material an hour. Truck sprinklers moistened the dirt where necessary. Bladed into lifts averaging 10 inches deep, the soil was compacted to the required 95% density by rollers.

The worst job problem, by far, was the production and installation of crushed rock. Plans called for 104,000 tons of 2-in. minus sub-base material, 40,000 tons of 1-in. minus base course rock for leveling, and 37,000 tons of ¼-in. minus hot-mix aggregate. There were also 1,500 tons of ⅜-in. minus chips which were to be used in armor coat work on the shoulders.

The thing which made rock so hard to produce was the fact that the only source of supply was a malapai pocket about 1½ miles from the east end of the job. It made excellent road-building material—if anybody or any equipment could crush it.

Much of New Mexico's malapai is open textured, coarse grained and has frequent blow holes. This was a denser-grained rock, relatively light in weight, and about as tenacious as rock can get. There were no short cuts in crushing, drilling or shooting the material, because this rock resisted fracture. In crushing, it had to be picked up, seized, held and crushed between powerful jaws. Even after it was crushed, the deficiency in fines was great enough so that 20% sand was added to sub-base rock on the road, from an outside source.

Resists Breaking

Since the quarry-loading shovel was a Bucyrus-Erie 38-B, with a 1½-yd. Esco dipper, Cowart realized that the rock had to be broken up considerably finer than if it were merely being excavated as part of a grading item. To pass the primary jaws of the crusher unit, any of the rock not passing freely through the 38-B's dipper was too big. It was an extremely difficult proposition to drill and shoot malapai, whose characteristics included cracks and fissures which absorbed the force of explosives.

Cowart brought in a Joy Class CT-1 self-propelled drill, powered by a Joy 600 Air Vane rotary compressor. This unit drilled 3-in. diameter holes 20 feet deep. The second unit was a D8 tractor, on which were mounted a Gardner-Denver type WHX 2001 vertical compressor and two type RMC 12 drills on Gardner-Denver jibs. These jibs were selected for quick positioning of the drills. The machine used Timken 2½-in. diameter tungsten carbide bits to sink 20-ft. deep holes.

In an effort to develop maximum powder force, drill holes were spaced on centers as close as five feet, and in some

Powered by a Joy 600 compressor, this Joy CT-1 drill puts down 3-in. diameter blast holes 20 feet deep in malapai rock.

cases these were even staggered. By keeping tungsten carbide drill bits sharp, the drills averaged a 20-ft. hole in approximately 25 minutes. When a block of holes had been completed, it was loaded heavily with an explosive ratio of one pound of powder per cubic yard of material.

Ammonium nitrate fertilizer shooting was tried initially, but it rolled out too many blocky boulders. A granular type 40% powder was used, but it left much to be desired, too. A switch to Illinois 40% ammonia gel gave much better fracturing. Even so, the number of large size boulders which rolled up from a bank of broken material was discouragingly big. These were picked out selectively by the shovel, and then shoved to one side by a Cat D8 with U-dozer.

The problem of drilling, shooting and excavating this rock was so acute that it turned out to be the worst production bottleneck. An expensive and complex crushing layout was set up, which could handle up to 250 tph, if that much material could be supplied to its feeder. But the selecting and kicking out of oversize boulders frequently delayed the trucks to the point where the crushing plant couldn't work full time.

Because the lava rock requires 100% crushing, and because the trend in New Mexico highway construction is toward bigger and bigger jobs, Cowart brought in a multi-unit group of portable components which, when assembled, made one of the state's finest crushing setups.

Versatile Plant

The plant was designed to do high capacity primary crushing, to produce two sizes or more of material at once, and to operate with a minimum of labor and expense.

Passing through this plant, rock was dumped first into a 42-in. by 30-ft. apron feeder, which moved the material into a Pioneer 153-PRL primary crushing unit. This unit carried a 3042 jaw crusher, powered by a General Motors diesel engine. A transfer box at the end of the primary unit formed an angle point, so that the flow of material was directed at a right angle to the primary unit.

A Pioneer plate-type feeder in the transfer box sent from the primary unit throughs by 30-in. conveyor to a Cedarapids portable plant, equipped with a 2540 jaw crusher and a scalping screen. This plant was powered by a D342 diesel. Purpose of the plant in the lineup was to scalp off acceptable fine material and take it out to a surge bin; then to work on the retained fraction by crushing it down still finer.

Throughs from the jaw crusher on this unit passed to a transfer box, equipped with two Pioneer feeders. This transfer box was a focal point in the system, because rock could be pulled either of two ways to supply two Pioneer portable plants for further reduction.

On 2-in. minus rock production, one feeder was used to send crushed primary throughs into a Pioneer 46-VE Duplex plant, powered by a Murphy diesel engine and a Murphy diesel-electric generating set. This plant had a 1036 jaw crusher, a set of 4022 rolls, and vibrating screens. The rolls were arranged in closed circuit with the screening system, so that an acceptable 2-in. minus subbase rock product could be produced at speeds up to 200 tph.

Rock could also be taken from the transfer box and sent to a Pioneer 45-VE Duplex gravel plant. The 45-VE plant was electric powered through a Murphy diesel-electric plant. Its rolls were

Continued on page 34

Pushloaded by a Cat tractor, this Euclid scraper picks up a heaping load of red, sandy material in one of the grading sections.

all-new 365-cfm GYRO-FLO

...a heavy-duty portable compressor with MORE POWER and MORE PERFORMANCE

Ingersoll-Rand, the pioneer builder of portable rotary compressors, now offers a completely new size Gyro-Flo portable—the DR-365. This rugged, all-new compressor provides 365 cfm of mobile air power—16% more than its predecessor, the Gyro-Flo 315. Yet, the DR-365 is no bigger than the 315 cfm Gyro-Flo, and its larger, more powerful engine retains the same 1800 RPM speed.

Take a closer look at what this all-new compressor offers: A new, simplified, more-efficient compressor system with...automatic drainage of oil from cylinders when the unit is shut down...dependable Air-Glide capacity control for 100% stepless regulation...a 12-volt battery system for faster, easier starting... side covers that fold back safely out of the way... a full-length, large capacity tool box to provide extra storage space...all operating controls, fuel tank, filters and tool storage enclosed by lockable side covers. These are just a few of the many features that mean more power, better performance, and greater convenience and safety, too.

The Gyro-Flo 365 is powered by the GM 4-71, 4-cylinder diesel engine. The Gyro-Flo 365 has a heavy-duty, spring-mounted running gear with automotive-type steering—every part built to withstand the hard service encountered on construction jobs. And remember, Ingersoll-Rand's Gyro-Flo line is complete ...six sizes that have become first choice among performance- and economy-minded construction men.

Ask your Ingersoll-Rand representative for complete information or send today for Bulletin 2932.

DIMENSIONS AND WEIGHTS	DR-365 with Diesel Engine
4-WHEEL MOUNTING	
Weight (dry)	5939
Weight (wet)	6640
Length (less drawbar)	10′ x 5¾″
Width	5′ x 8″
Height	6′ x 10½″
Track	56
LESS RUNNING GEAR	
Weight (dry)	5279
Weight (wet)	5980
Length	10′ x 2⅞″
Width	4′ x 9½″
Height	5′ x 2¾″

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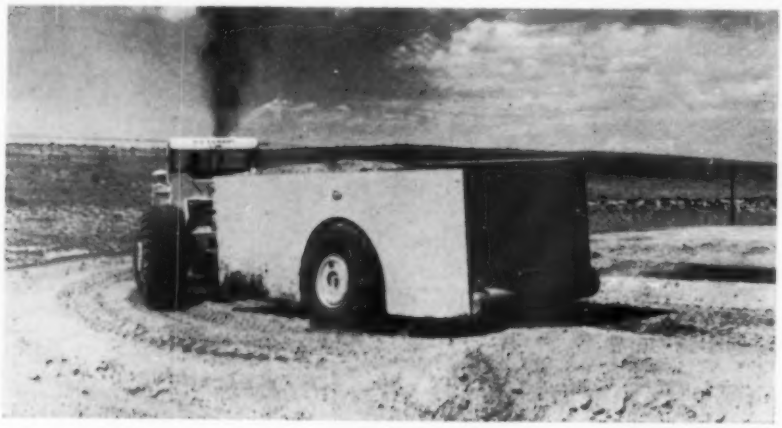
AN UNBEATABLE COMBINATION...GYRO-FLO COMPRESSORS AND I-R ROCK DRILLS

(Above) A Transit Crane demolishes an old concrete structure being replaced by the new one in background. (Below) A 50-ton pneumatic Tampo compacts a lift of dirt fill.



End of era is shown below as Cat tractor and hydraulic ripper demolish old bituminous pavement on the portion of U.S. 66 being modernized by this interstate road job.

Malapai . . .

Continued from page 32

driven direct by a Murphy diesel. This plant was equipped with 1-in. screens, a 1036 jaw and 4022 rolls. It was used principally for turning out 1-in. minus leveling course material. Later, screens in this plant were changed so that ¾-in. hot-mix aggregate could be produced at 135 tph.

Average output of the plant was 2,000 tons per 12-hour shift, with production governed largely by the difficulty of getting enough raw material to feed the plant. On finer sizes—hot-mix aggregate and chips—production dropped with the crushing ratio.

The crushed rock was laid in 4 and 5-in. lifts under carefully controlled moisture conditions, and with good compaction. After being hauled from the plant surge bins by a fleet of rented Ford, Chevrolet and GMC dump trucks, the material was dumped in a windrow and spread by a Caterpillar No. 12 motor grader. When a lift was flattened out, pit-run sand (No. 200 through No. 4) was hauled in by a separate group of dump trucks, loading in a small pit two miles north of the project.

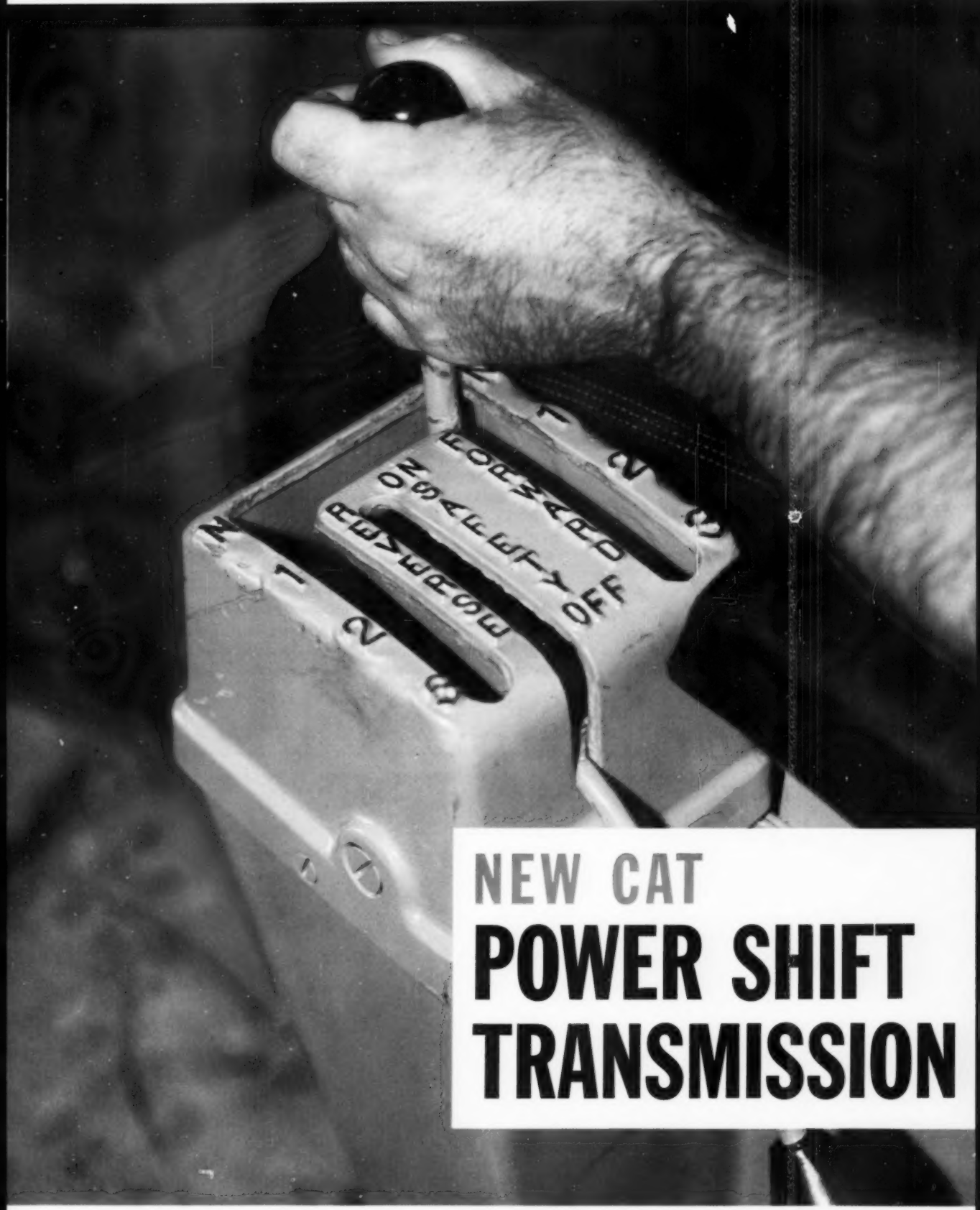
Mix Materials

The material was spread on a ratio of 30% pit run sand and 70% crushed rock. It was then blade-mixed by motor graders, and its 8% moisture optimum was added by water tank sprinklers. After being roadmixed, the material was laid without particle segregation. A 50-ton Tampo pneumatic roller, towed by a Euclid prime mover, performed the compaction work. There was also a double set of Tampo pneumatics of smaller size, pulled by an International rubber tire tractor, which was used for top compaction.

Completion of the sub-base in this manner left a tight, well knit bearing blanket which today carries the surfacing pavement and high-speed traffic.

The job is a fine example of modern highway building and practice in the Rocky Mountain states. The project is only 80 miles from the Continental Divide, and is located at high elevation. From all appearances, it will serve traffic for many years to come.

O. D. Cowart lent personal supervision to the job, with C. R. Jurgensen as general superintendent. Covering the job daily, these men watched every detail to see that this important reconstruction was finished ahead of time and below cost estimates.



CATERPILLAR'S No. 1 PROJECT

PAYS OFF FOR YOU AGAIN! A multimillion-dollar research program—to meet the continuing challenge of the greatest construction era in history with the most productive earthmoving machines ever developed.

NEW POWER SHIFT TRANSMISSION for CAT D9 and D8 TRACTORS

Shifts on-the-go under full load in a split-second! ■ Changes speed, reverses direction with finger-tip control lever—and no clutching!

The wraps are off—it's ready. After many years of research and on-the-job testing, Caterpillar now offers a revolutionary new transmission option for Cat D9 and D8 Tractors—power shift. The most recent Caterpillar new product development, this new transmission—with an exclusive design—provides production highs never before possible with a track-type tractor. Here's why:

1. It combines for the *first* time the flexibility and anti-stall features of torque converter with the operating snap of direct drive! And because of its direct drive characteristics, it is more efficient than other power shift designs.

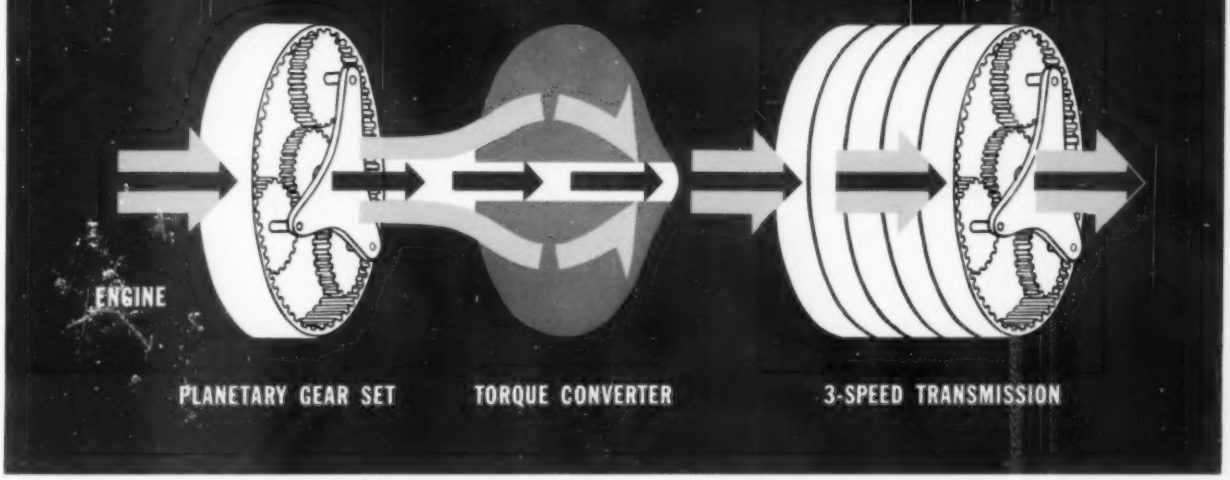
2. With one control lever and no clutching, it reverses direction . . . changes speed . . . smoothly . . . under full load . . . in a fraction of a second!

Talk about productivity—Cat power shift delivers in a big way. Split-second, on-the-go shifts give plenty of power in the highest gear possible. Shifting is so easy the operator just naturally gets more work out of the tractor. What's more, he gets it on the toughest, most demanding track-type jobs. Cat power shift design is strong and rugged for the *heaviest earthmoving duty*.

Get the details about this power shift from your Caterpillar Dealer. Ask for a demonstration—see for yourself how it steps up production. Remember, you also have your choice of direct drive or torque converter in the D9 or D8. Whatever the application, Caterpillar has the most productive machine for it!

HIGHER PRODUCTION PUSHLOADING: *Power is quickly, easily adjusted to meet the demand. Shifting to higher gear boosts scraper out of cut at higher speed, increases production. Speedy reverse quickly positions machine for next push.*

CAT POWER SHIFT TRANSMISSION



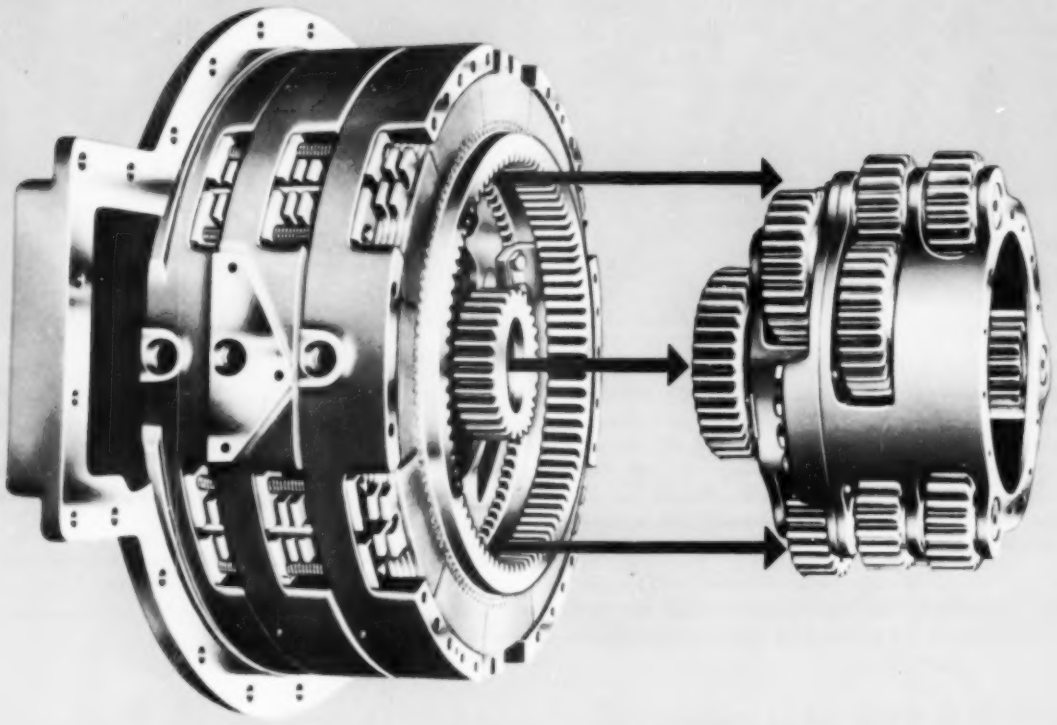
BASIC DESIGN: Total power is transmitted from the engine to a planetary gear arrangement mounted in the engine flywheel. The planetary divides and directs the total power — part goes through a direct drive shaft straight to the transmission and the remainder through a torque converter to the transmission. This enables the Cat power shift to combine some of the efficiency and the positive operating feel of direct drive with the anti-stall and flexibility features of torque converter drive.

Power shift control is mounted to the left of the operator (see previous pages). One selector lever (black knob) eliminates gearshift, forward-reverse and flywheel clutch levers. The safety lever (red knob) prevents accidental transmission engagement. The selector lever moves in a "U" path to various positions. To the left are three reverse speeds. To the right, three forward speeds. To change speed, simply move lever to the required position. To change travel direction, move lever to the opposite side. Changing speed and direction are as easy as that—without clutching—and changes can be made while the machine is in motion under full load without loss of power.

Pioneered by Caterpillar, this uniquely designed power shift is engineered and built for heavy earthmoving service—it's rugged! The transmission itself weighs over one ton! And its clean, unit construction design makes it easy to service, when required.

HIGHER PRODUCTION BULLDOZING: *As the material builds up, Cat power shift permits split-second, on-the-go shifting. There's no forward surge when the load is dropped. Instant reversing further slashes cycle time on a bulldozing assignment.*

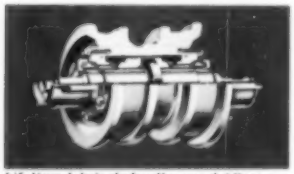
ONE TON OF RUGGEDNESS



—CAT POWER SHIFT TRANSMISSION!

You're looking at a portion of the components that make up the new Cat power shift transmission. This rugged transmission, weighing over a ton, is designed and built specifically by Caterpillar for its giant tractors. Every component is constructed for long-lived service. Selected alloy steel insures performance that stands up under the toughest conditions. Equally important, Cat power shift comes to you thoroughly tested by exacting design and demanding field work in the heaviest earthmoving duty. You can be sure that it will stay on the job.

In fact, every feature of D9 and D8 Tractors is specifically designed and built to keep these machines working *profitably* for you. For example, lifetime lubricated track rollers never require further lubrication until rebuilding. They feature Caterpillar-developed, *exclusive* floating-ring seals that assure constant, positive sealing. These seals—plus a rugged design featuring bushing-type bearings and deep hardenable alloy rims—plus 2½ million test hours—make Caterpillar rollers ready for the toughest jobs.



Lifetime lubricated rollers and idlers—one of many other rugged features of Cat D9 and D8 Tractors.

In short, nothing has been overlooked to make these modern, heavy-duty machines the most practical and most productive in their class in the field.

For complete facts on the new Cat power shift see your Caterpillar Dealer. He's ready to explain in detail how the Cat power shift works, or to demonstrate its ruggedness . . . its ease of operation . . . its productivity. Name the date—he'll demonstrate!

Caterpillar Tractor Co., Peoria, Ill.; San Francisco, Calif., U. S. A.

CATERPILLAR

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DIESEL ENGINES • TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

BORN OF RESEARCH
PROVED IN THE FIELD

On 1¼ million yard highway job:

3-yard Manitowoc heaps haul units at rate of 160 loads each 8½-hr. shift

An important segment of the Interstate Highway program is now under construction 20 miles Southwest of St. Louis. Here Fred Weber Contractor, Inc. of St. Louis has the contract for approximately nine miles of new Interstate 44.

One section of the 1¼ million yard job is shown here — a 35,000 yard cut paralleling U. S. Route 66. Weber is using a 3-yd. Manitowoc Model 3600 shovel on this cut. An average of 160 heaped haul units are loaded each 8½ hour day. The hauling fleet, six 25-yd. and two 18-yd. units, has a long 12,000 ft. one-way haul, stopping traffic to high-ball across Route 66.

"Easy as pie" operation

On the same job Weber also has another 3-yd. Manitowoc shovel, a 25-ton Manitowoc Crane driving 50-ft. piles 45-ft. deep, and a 2½-yd. shovel working in a nearby quarry. When interviewed at the job site, Superintendent John R. Weber said, "We're getting very good production from the model 3600. It gives us more output with less maintenance." And the shovel operator, F. C. Warneke noted, "It's easy on the operator because air control makes it easy as pie."

Bonus Output Features

The Manitowoc 3600 gives you air controls, torque converter drive, disc-type clutches, and removable counterweight as *standard* features . . . provides equally great performance as a trench hoe, crane, dragline or clamshell. Analyze your upcoming bids now . . . see how the 3-yd. 3600 can help your profit picture. Your Manitowoc distributor will gladly fill you in on all the facts.

Manitowoc

MANITOWOC ENGINEERING CORP.

(A subsidiary of The Manitowoc Company, Inc.)

MANITOWOC, WISCONSIN

CRANES	SHOVELS	DRAGLINES	TRENCH HOES
25 TON - 100 TON	1¼-YD. - 5½-YD.	1¼-YD. - 6-YD.	1¼-YD. - 3-YD.

PUT YARDS AH PRODUCTION ON

See for yourself what we mean by the "Yards Ahead" performance of the Curtiss-Wright scraper line. Make your own guess of how many yards of tough clay, shale and rock are packed in the heaping bowl of this Curtiss-Wright model CW-226! Even at the most conservative estimate, you'll agree that this is the high production you want on your job. Remember, this is no ordinary machine . . . It is the CW-226—largest two-axle scraper on the market . . . one of the five that are working on Talbott Construction Corporation's Erlanger, Kentucky road construction contract . . . another job being completed faster and more profitably by the "Yards Ahead" performance of Curtiss-Wright scrapers.

CURTISS-WRIGHT CORPORATION

SOUTH BEND DIVISION, SOUTH BEND, IND.

SOUTH BEND DIVISION

CURTISS-WRIGHT

CORPORATION

SOUTH BEND, INDIANA

Lay Pipeline in Mississippi Mud

Panama-Williams lays 24-in. loop line for Michigan-Wisconsin Pipe Line Co. in Illinois and Iowa. Heavy rains hit the job as one spread tackles its toughest phase along Mississippi River.

ONLY the mudders found the going to their liking during a recent phase of operations on a Panama-Williams job to lay 127 miles of 24-in. loop line in Iowa and Illinois.

Michigan-Wisconsin Pipe Line Co., whose main headquarters are in Detroit, Mich., let contracts early this year to Panama-Williams Co., R. H. Fulton & Co., and Somerville Construction Co. to build approximately 347 miles along its present system in Missouri, Kansas, Iowa, Illinois and Michigan.

Fulton had five spreads working in Kansas and Missouri to lay 220 miles in six loops. Somerville had a fleet in Michigan.

For Panama-Williams, two spreads in Iowa were working on 42.7 miles between Lineville and Centerville and 39.8 miles between Mt. Pleasant and Oakville. A third fleet in Illinois was laying 41.7 miles between New Windsor and Princeton. The loops are expected to increase the capacity of the original 16-in. line by approximately 75%.

The Panama-Williams firm, which is located in Houston, Tex., scheduled their portion of the job for completion in 30 working days.

The Mt. Pleasant portion of their contact was typical. Grading operations there began April 6; ditching started April 14 and laying commenced April 15. It was rolling country where the soil was primarily clay.

Rolling Terrain

Clearing was accomplished by three Caterpillar D7 crawlers with straight dozer blades. No particular clearing problems were encountered. Two to 4-ft. sidehill cuts were made in some places to cut down the rolling terrain, while power saws cut down brush and trees along the 75-ft. right-of-way.

However, the Mt. Pleasant-Oakville loop includes about 32,000 feet of Mississippi River bottom land. The problems of pipelining in this wet, sandy loam were compounded by the fact that the loop also parallels the Cedar River, only a mile away, for several miles. Trenches filled quickly with ground and rain water, requiring much pumping with two 6-in. Hercules and Jaeger water pumps before work could progress.

Trench dimensions—38 inches wide and 54 inches deep, or enough to put the pipe 30 inches below existing terrain and structures—had to be adapted to the river bottom soil. The trench was widened to a 1½ on 1 slope through use of

Mud is nine feet deep as Caterpillar No. 583 pipelayers lower-in a long weighted section of 24-in. pipe in southeastern Iowa.

wings on the ditchers. Two Bucyrus-Erie 22-B hoes, one Cleveland 320 ditcher, one Parsons 420 ditcher and a Caterpillar D6 tractor handled ditching. The hoes ditched through the small amount of rock on the job.

Heavy spring rains saturated the river-bottom land, and the combination of rain and soft earth caused many cave-ins behind the ditchers. In several cases, cleaning, priming, doping and lowering had to be delayed until a 22-B clam could excavate the cave-ins. On the day before the rains came, Panama-Williams laid 201 of the 40-ft. random joints in the river bottom land.

At one portion of the loop near Oakville, the line had to go under a drainage canal about 12 feet wide. Some of the pipe in this area was lowered and, in anticipation of rain, backfilled in spots. The backfilling proved insufficient and the line floated up at several locations. Trenches then had to be re-excavated and the pipe re-lowered. In order to place the pipe under the drainage canal, four sets of concrete weights—each weighing approximately 5,300 pounds—were bolted around the line at 15-ft. intervals.

New Pipelayers

One of Panama-Williams' three new turbocharged Caterpillar No. 583 pipelayers was forced to operate in 8 to 10 feet of mud that dammed the drainage canal. Then the No. 583's lowered the weighted pipe into the canal bed. The operators and foremen said the new pipelayers "more than filled the bill." They were relieved that they did not have to grease the lifetime-lubricated rollers in the deep, abrasive mud.

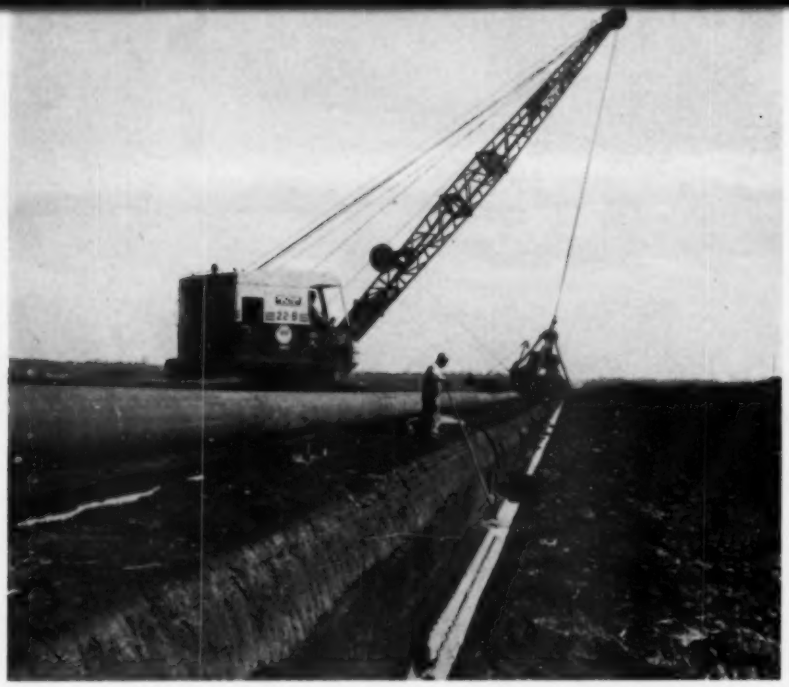
The Mt. Pleasant loop also involves crossing two rivers—the Skunk, 5 to 6 feet deep and 215 feet wide, and the Big Creek, 4 feet deep and 120 feet wide. Red Wylie, assistant superintendent of the Mt. Pleasant operations, said draglines would be used to trench Big Creek, but a dredge would be needed for the Skunk River. The contract calls for an 8-ft. cover in the river beds.

Bending was done by a CRC machine, assisted by a Caterpillar MD7 pipelayer. Maximum bends permitted by the contract were 19½°.

Panama-Williams' pipe spread included one Caterpillar MD7 pipelayer, a D7 tack rig with a Twin-Arc Lincoln welder, two Homelite generators, a 24-

(Above) A Cat MD7 pipelayer lifts 40-ft. random sections from a truck. (Below) About 20% of the joints had to be bent. A CRC bending machine shapes the pipe.

Working in dry clay, a Cleveland ditcher cuts up to two miles of trench a day.



High water table and heavy rains cause many cave-ins across the river bottomland. A Bucyrus-Erie 22-B clam cleans out most of the ditch before work can progress.

Two crawler tractors inch a Bucyrus-Erie 22-B hoe up a steep, high bluff separating the bottom land from firmer ground. Another 22-B cuts the ditch through rocky clay.

in. burr machine, one Perrault inside clamp, a school bus and two 6 x 6 skid trucks. A D7 tractor with a Twin-Arc Lincoln welder was also being used by the welding crew, in addition to another school bus and a D6 crawler for towing. The maneuverability of the crawler-mounted welding rigs proved valuable in the extremely muddy conditions.

Red Wylie said the cleaning, priming, doping and lowering crews put down 4,500 feet a day in the bottom lands and would lay 8,500 feet daily once the spread got away from the bottom. A self-propelled CRC cleaning and priming machine was mounted on the pipe, which was cradled by a No. 583 pipelayer that also pulled a sled of materials. Usually, two smaller machines were used for this series of operations.

Behind this team, another No. 583 pipelayer cradled the line for coating, wrapping and lowering. A CRC coating

(Left) Spread includes two Cat D311 Twin Arc welders and (Right) CRC cleaning, priming, coating and wrapping machines.

and wrapping machine, carried by a third No. 583, coated the pipe with Koppers No. 2 asphalt base, which was $^{3}/_{32}$-in. thick, and wrapped it with 8-lb. felt and fiberglass. The finished line dropped directly into the ditch from this machine. An Allis-Chalmers HD-20 handled catchoff duties.

Two Myoco 30-barrel pots, one CRC 30-barrel pot, one Littleford 18-barrel pot, a Mack tractor and float, a Homelite generator and one 6-in. water pump completed the equipment parade.

The following equipment was used for lowering and tying-in: a Bucyrus-Erie 22-B clam, three new turbocharged No. 572 pipelayers, a 24-in. burr machine, a 2-ton flat-bed truck and a Homelite generator. Wylie said tie-ins which normally took 30 minutes dragged out to as long as a day because of the extremely muddy conditions.

An Allis-Chalmers HD-21 dozer and a D6 crawler equipped with a backfiller took care of backfilling operations. Clean-up was handled by a D7 dozer, two A-C HD-16 tractors and a Caterpillar No. 12 motor grader. The grader bladed dope drippings into the trench before backfilling and handled finish grading.

Subcontractor

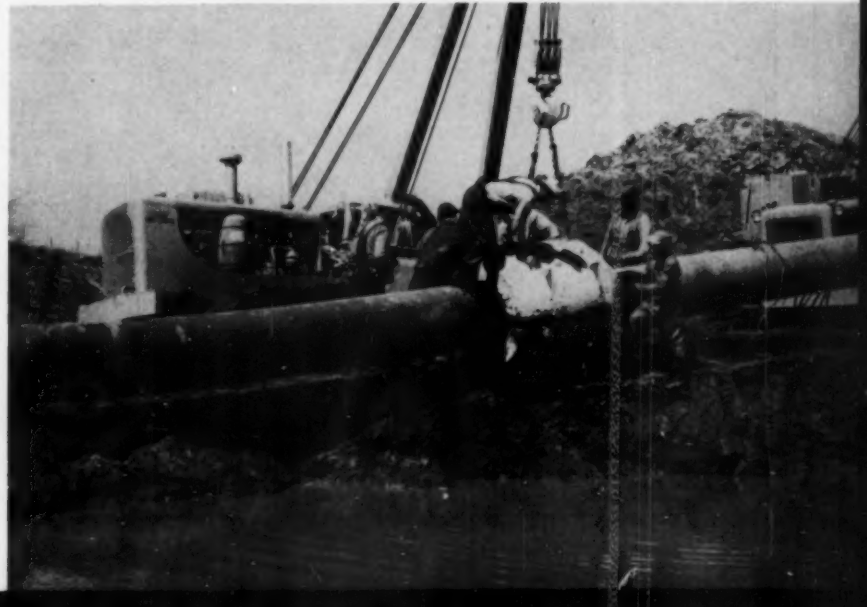
Stringing on the Mt. Pleasant project was subcontracted to Parkhill Trucking Co., Tulsa, Okla. Parkhill's superintendent was Harvey Weston. Parkhill used a MD7 pipelayer for this operation, plus five Ford trucks that carried 9 to 10 joints per trip. Wall thickness of the 24-in. diameter pipe was 0.312, 0.375 and 0.500.

A. E. Tedeschi was supervisor for Horizontal Holes, Inc., Houston, Tex., which had a subcontract for 17 borings. Curt Vaughan, of Ford-Bacon-Davis Corp., was the chief inspector.

General supervisor of the three Panama-Williams jobs was W. H. "Cooney" Shiflett. Blackie Woodruff was assistant supervisor of the Centerville job and M. E. Sutton had the same post at New Windsor.

Foremen for Panama-Williams, Inc., on the Mt. Pleasant job were Hack Blackburn, grading; Dick Pence, ditching; J. M. Barron, bending; E. N. Humphreys, pipe; Bill Wilson, welding; Rip Vann, doping; Pete Aswell, lowering and tying-in; and L. L. Bell, clearing.

(Left) Preliminary backfilling holds the buoyant pipe down. (Right) At a crossing, 5,300-lb. river weights are added.



McLean Reroutes Springfield's U. S. 66

Urban expressway provides intricate roadway excavation problems for Missouri firm.

by L. H. Houck

A PROJECT with more problems to the foot than the Chestnut Street Trafficway project in Springfield, Mo., would be hard to find in the "Show-Me" state. Besides the usual grading and paving chores, for good measure there are a few hundred related details of demolition; pavement breaking; closing off house drains every 50 feet or so; and installation of a sewer line within a maze of intersecting utilities.

The Chestnut Street project will be a high-class city route of present U. S. highway 66.

Heavy Traffic

U. S. 66 carries one of the heaviest streams of 24-hour cross-country traffic in the country, earning for itself the name of "Main Street of America."

Interstates, freeways and limited access highways are fine, but some means has to be built so travelers can get into towns when they want to. The Chestnut Street Trafficway is designed for that purpose.

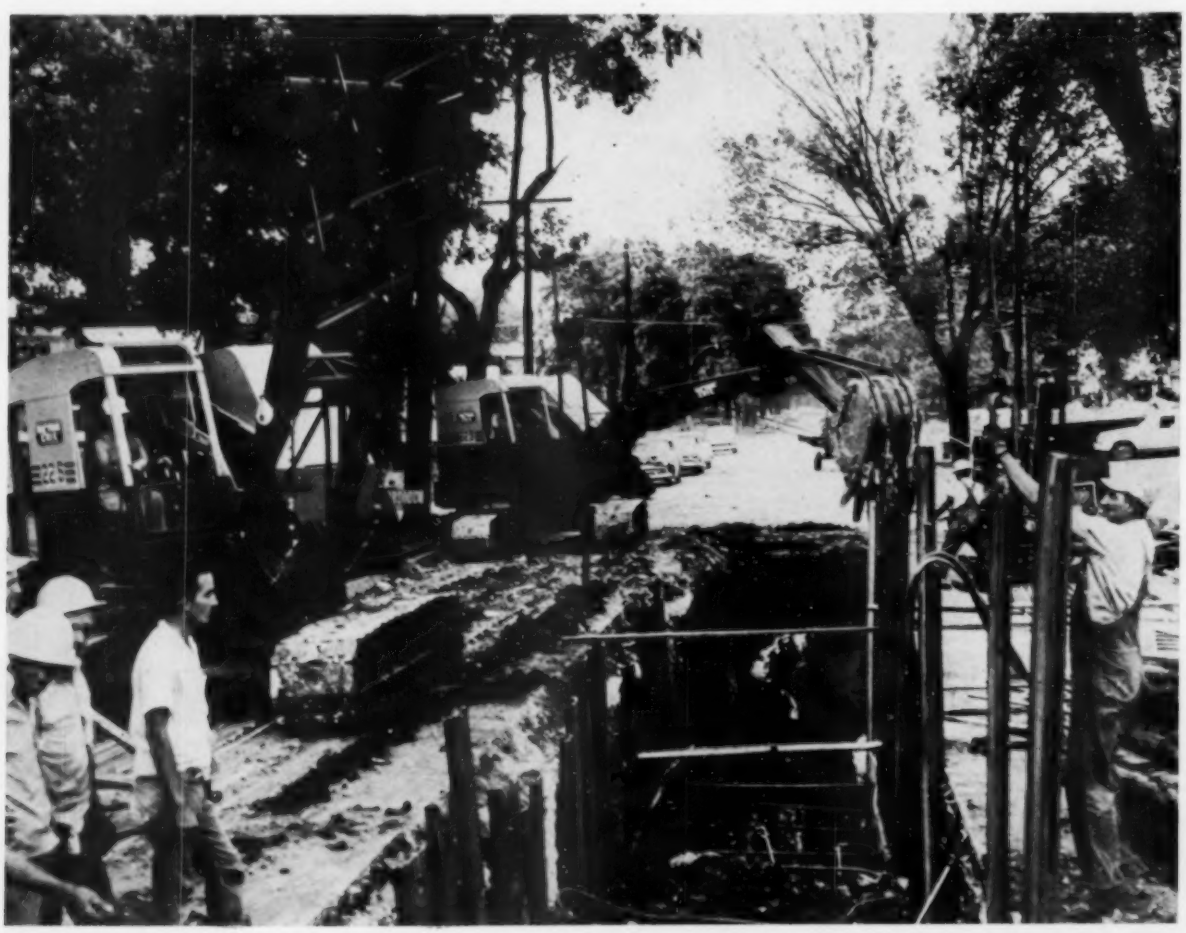
It also modernizes the downtown traffic plan for Springfield, for it is being built only five blocks from the heart of the city, adjacent to the city hall.

Before grading and paving can be done, new storm sewers have to be installed. The contractor has to disconnect hundreds of residential drains and attach them to the new drainage system. The new sewer system utilizes reinforced concrete pipe in sizes from 12 inches to 48 inches, running as deep as 27 feet underground.

Also required are new roadway grades, paving, a new bridge over existing railroad tracks, and paving and grade revisions for the dozen or more intersecting streets. Some existing pavement must be broken up and removed. Some areas must be cleared of buildings. The contractor must maintain barricades, warning and flagging for traffic and access for residents. The job is further complicated by a large number of entrances into the construction area.

Because of the intricate detail in such a small area, the Missouri highway engineers wisely divided Chestnut Street into three separate sections, subject to three bids.

Fortunately for the speedy completion of the project, McLean Construction



While crane in foreground pulls steel piles from completed trench, hoe in background provides the hammer blows to reset them.

Here is one of the random boulders that show up in red clay. Jackhammer is powered by a 365-cfm Gardner-Denver.

Co., Springfield, headed by Lee McLean, Jr., was qualified to bid on all three sections, both by experience and by the yardstick of owning new and modern equipment.

The project was awarded to McLean, all three sections, in August 1958. McLean put all new equipment to work immediately.

Specifically Chestnut Street Trafficway was set up this way:

The first phase consisted of 0.3 miles of 35½-ft. wide concrete pavement, near Sherman Avenue and extending east to National Avenue.

This section included 6,692 cubic yards of Class A excavation, 1,041 cubic yards of Class 3 excavation (which is excavation for structures), 6,823 square yards of 8-in. reinforced concrete pavement and 1,873 square yards of non-reinforced pavement.

Some idea of what had to be done before paving could even be thought about can be gained from the specifications which called for 410 feet of 12-in. reinforced concrete pipe; 161 feet of 15-in.; 122 feet of 18-in.; 499 feet of 24-in.; and some 500 or more feet of miscellaneous pipe, culverts and connections.

This first phase was awarded to McLean for $100,960.

The second section specified grading and construction of culverts and retaining walls for the trafficway, from Washington Avenue east to Sherman Avenue, a distance of 0.222 miles. Concrete pavement is 24 feet wide.

This section is complicated by a bridge 350 feet long over the existing much-used Frisco railroad tracks. The bridge is a 4-span continuous I-beam structure with two simple spans.

The section calls for 1,540 cubic yards of Class A excavation, 1,743 cubic yards of Class 3 concrete, and 2,268 square yards of 8-in. reinforced concrete paving. Also included are 488 feet of 12-in. reinforced concrete pipe; 473 feet of 24-in.; 274 feet of 30-in.; and 165 feet of 12-in. Contract price is $379,503.

The third section of the project contains the largest amount of excavation, 37,571 cubic yards of Class A and 9,280 cubic yards of Class 3. It provides for removing old pavement, grading culverts and construction of an outer roadway concrete pavement 35 feet wide from Grant Avenue east to Washington Avenue, a distance of 0.7 miles. Included are 693 feet of 48-in. concrete storm sewer pipe, to be placed at depths up to 27 feet. This phase of the project was worth $466,394. These three projects comprise the first stage of construction for the Chestnut Street Trafficway and amount to almost $1 million.

Excavation in the Springfield area has been known to deliver some knockout surprises.

Soils Formed

This area is the northern boundary of the Ozark Highlands, which the geologists fondly call the Springfield Plateau. What seems to have been a prehistoric conspirarcy against modern day equipment and contractors was consummated when the northern half of the United States was covered by four separate glacial ice sheets. Even though the glaciers stopped their southward trek at the Missouri River, the water from melted ice ran in torrents over this part of the country for thousands of years.

These waters dropped their rock, chert and sands as they hit the Ozark uplift. Waters from rain and snow laden with vegetable acids, dissolved rock structures to form caves and altered sub-soils to form clays.

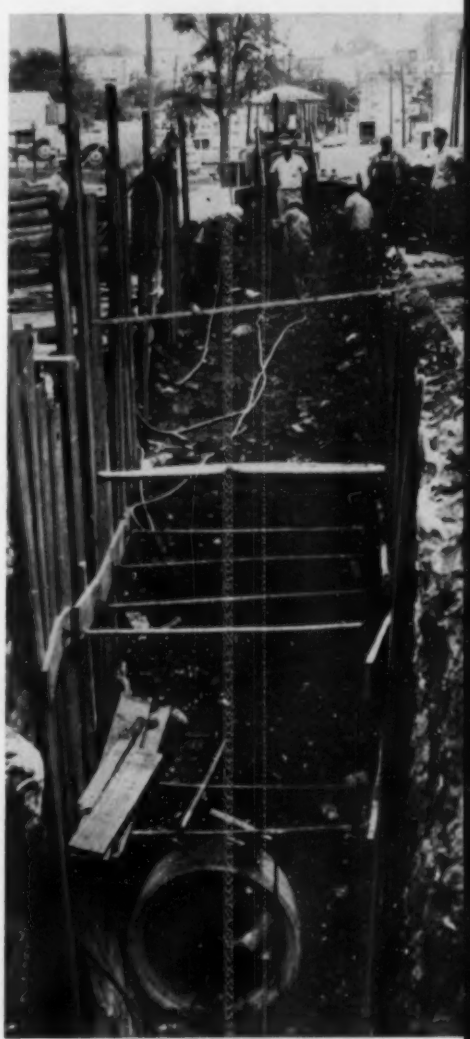
Formed in this same geological age was the big cave-and-cavern tourist country only a few miles to the east, and the lead and zinc deposits of southwest Missouri 70 miles to the southwest.

However it came about, big limestone boulders surrounded by sticky red clay are now a characteristic of the formation and constitute a problem to orderly and speedy trenching.

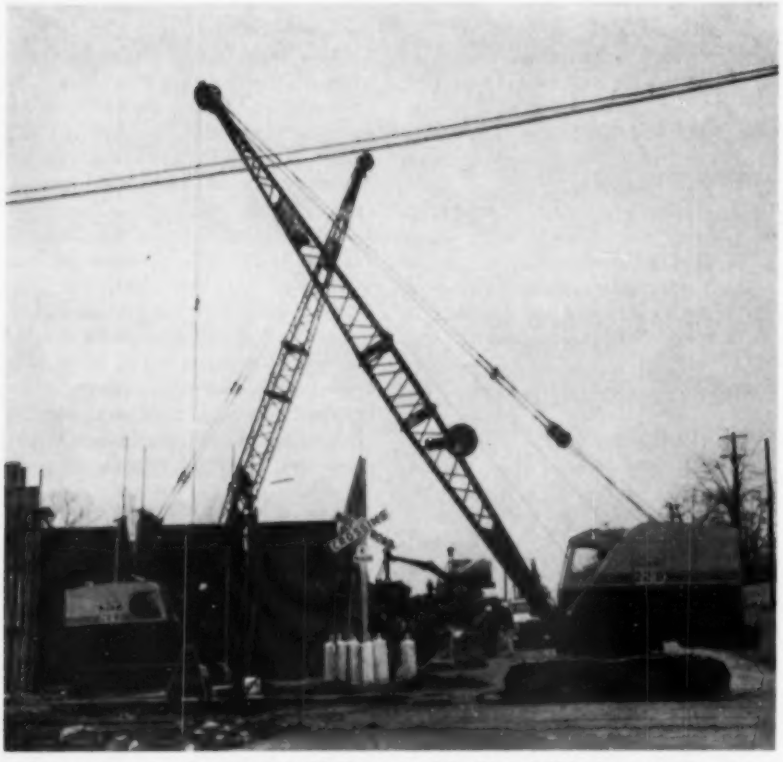
These problems were of course well known to Lee McLean, when he selected equipment for the job on which he was going to bid. He had a work site in a highly congested area where machine movement would be restricted and set-ups and moves expensive.

McLean's final selection was three new Bucyrus-Erie 22-B's mounted on long wide 36-in. crawlers. They were delivered in time to start the job last fall.

One 22-B was bought with a dragline hookup, 50-ft. boom and ¾-yd. bucket. It was also used as a crane for unloading concrete pipe from trucks, depositing pipe in position at trench bottoms, lowering and removing crawler air drill equipment used on limestone boulders and rock sections, and other



Here is a section of 48-in. pipe going in at 17 feet. Backfill pushed in by a Cat D6 is compacted with air tampers.



McLean has a trio of heavy-duty 22-B's on the job. Clamshell in foreground removes rubble, while crane erects structural forms. Hoe in background digs footings.

miscellaneous jobs. The other two 22-B's were equipped as hoes with ⅞-yd. dippers. One dipper was an Esco and the other an Amsco.

All three 22-B's are powered with 3-71 GM two-cycle diesels, and have AC fuel and oil filters.

Besides working on trenching, these rigs were also gainfully employed on the bridge construction.

The hardpan formation did not present much of a problem to the hoes, but the big limestone boulders that cropped up presented rock of tonnage that stopped the machines in their tracks.

Operators used their hoe dippers to clean the red clay and rock from around the boulders to expose areas for drilling blast holes.

Since heavy blasting was out of the question, holes were somewhat lightly loaded. On the 48-in. pipeline trench, a Gardner-Denver crawler-type air drill was lowered to the bottom of the ditch for drilling. In other trenches a jackhammer was used for blast holes. When the blasts were ready to fire, the 22-B crane on the job lowered a mat cover to prevent high flying rocks.

Crane and hoe alike placed pipe, with the three 22-B's working every day on the same job. Following gangs setting the pipe sections, a crew of three men with Gardner-Denver air tampers worked on backfill, compacting lifts of about 8 inches. Some of the other equipment required included three 365-cfm Gardner-Denver air compressors, powered with 4-71 GM diesels. Several Caterpillar D6's were used for backfilling work as well as rough grading, and an Ottawa paving breaker was used to break up existing pavement.

New Paver

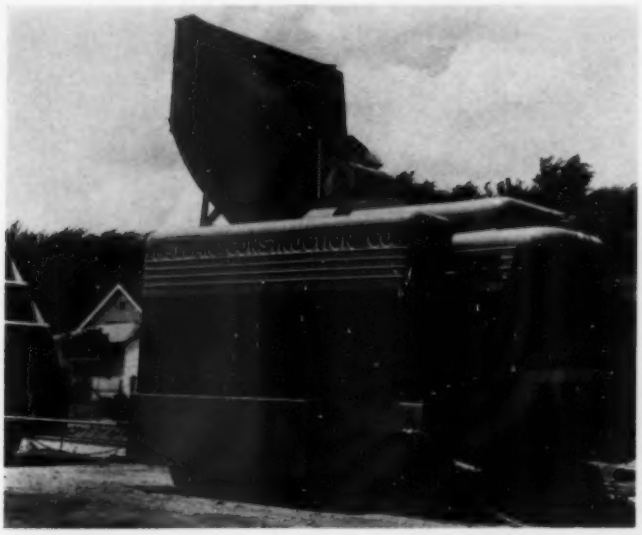
When the job was visited by *Excavating Engineer*, McLean had just placed in service a spanking new Rex 34-E paver. It was powered by a 4-71 "Jimmie," and its crew had it going full capacity like veterans.

The paver was supplied with cement and aggregate by a fleet of International S-170 trucks with Galion 4-compartment rear-dump bodies and with twin hydraulic lifts. Each batch compartment held two yards, or a total of 8 cubic yards.

The 350-ft. steel and concrete bridge over the Frisco tracks was getting its finishing concrete touches on the north lane, and the south lane was ready for setting steel I-beams. The bridge used a total of 345,000 pounds of fabricated I-beams.

Concrete for the bridge came in Smith

New Rex 34-E paver was bought especially for the Chestnut Street job. The automatic unit is fed by 4-compartment trucks.



(Left) Bottoms up and down the hatch with dose of cement and aggregate. (Right) Smith 6½-yd. mixer brings structural concrete.

6½-yd. transit mixers driven by 6-cylinder Chrysler industrial gasoline engines, mounted on Ford T-800 trucks. The supplier was Springfield Concrete Co. from its nearby plant.

McLean Construction Co., established in 1950, has handled a large number of the medium-sized jobs in Springfield with much success.

Young, dynamic Lee McLean has lately expanded into bigger projects.

The company's first large job, recently turned over to the owner, was a factory for Dayton Rubber Co., which will make V-belts. The big complicated job provided floor space of 215,000 square feet.

Representing the Missouri highway department on this job is Robert Duss, resident engineer with the department's District 8 office at Springfield.

During inspection of job, Lee McLean, Jr. (left), confers with Bob Duss, resident engineer for Missouri highway department; Paul Pulliam, paving superintendent; and E. H. Edwards, state highway inspector. Behind, a road finisher spreads concrete.

News from the Field

Electronic Tape Measure Keeps Offshore Job Moving

One of the problems of keeping an offshore pipe laying job on the move is that of keeping it on a straight line, even under foggy conditions. An engineering project on terra firma is usually surrounded by "bench marks," but fixing position out in the deep blue taxes the imagination.

Construction men, laying a 12-ft. ID concrete pipe from the Hyperion sewage treatment plant in Los Angeles to a point 5½ miles out in the Pacific Ocean, have found an answer. The big pipe, which is floated out to the work site in 192-ft. sections, must be placed on a straight line. So the city of Los Angeles has assigned a crew of surveyors to the contractor to determine the direction and distance the work barge should take for placing each new section. On clear days three men—one on the barge and the other two at shore stations—measure (with common transits) the angles of the triangle which their positions form. They compute the distance for each move by triangulation.

Surveyor on the pipelaying barge transmits highspeed electronic impulses to each of two shore stations, to fix location of the offshore line and keep it on a straight course.

Onshore at a receiving station, a surveyman talks with transmitter operator on a barge, just visible two miles offshore.

Engineers expect to encounter a number of foggy days offshore, however, when this method which is dependent upon clear visibility will break down. And without some alternate plan, the $21 million project would have to come to a standstill till the fog lifted. The necessity for an emergency measure is apparent when one realizes that the contractor is expected to lay nearly $75,000 worth of pipe a day. Even a few hours of fog would disrupt a tightly scheduled operation.

To avert this, they have brought in a Tellurometer system, an electronic device which measures distances directly by means of microwaves, much like radar. A master unit (or transmitter) is kept on the pipelaying barge out in the ocean. Two remotes (or receivers) are kept at separate shore stations about 4½ miles apart. Knowing precisely how far the barge must be from each of these points, the survey party can divert the barge forward to each new location in a matter of minutes. Because the electronic micro-waves are unaffected by fog or darkness, the threat of a delay is eliminated.

Operators, out of sight of each other, can communicate from barge to shore by means of the Tellurometer's built-in two-way radio. The instrument's range (up to 40 miles) and accuracy (to 3 parts in a million, plus or minus 2 inches) is more than adequate to enable the contractor to meet his specifications.

44-Mile Tunnel Uses Roof Bolts

Taking a cue from the mining industry, project engineers are using steel mine roof bolts to support all 44 miles of New York City's new West Delaware water tunnel—thereby saving several million dollars in construction costs.

To date, use of the roof bolts on the project in place of conventional supports has cut tunneling time in half, saved thousands of dollars per tunnel mile, and provided excellent protection from roof falls, according to the city's Board of Water Supply, supervising authority on the site. Its chief engineer is Stanley M. Dore.

Employed by the millions in mining, roof bolts supports were first used in a major non-mining tunnel application in the East Delaware tunnel, completed in

Continued on page 52

Sauerman DragScraper Digs and Hauls from Pit to Hopper for 8¢ Per Yard

Robert Wilson, Sr., president; Bob Wilson, Jr., treasurer; and Kent Wilson, vice president—Wilson Sand Co.

Track Cable DragScraper inhauling load to hopper from 40 ft. below water.

DragScraper and carrier returning to pit by gravity. Average haul is 500 ft. on a 675-ft. span.

Operating costs for Wilson Sand Co.'s new Sauerman DragScraper are estimated to be less than 8 cents per yd. This includes labor, maintenance and power costs to dig from 40 ft. below water level and deliver 90 yds. per hr. to the field hopper on an average haul of 500 ft.

Wilson Sand Co.'s new 125-tph. plant represents a steady increase in capacity which started with 20 tph. in 1939, using a small Sauerman Slackline.

Sauerman equipment has kept pace with the growth of their Upper Sandusky, Ohio plant. The Slackline was replaced by a 1½-yd. track cable DragScraper in 1951, and with a 2-yd. machine in 1953. The new Sauerman unit is a 3-yd. track cable DragScraper operated by a two-drum electric hoist equipped with air controls.

The DragScraper is digging 35 to 45 ft. under water down to bed rock on a 675-ft. span. The pit bank stands 40 ft. above the water, thus total depth of the deposit recovered by the DragScraper is about 85 ft.

Excellent material and the right equipment to dig and process are responsible for the continued growth of the Wilson Sand Co. Officers of the company are Robert W. Wilson, Sr., President, Kent Wilson, Vice President and Bob Wilson, Jr., Treasurer.

You can cut *your* costs by digging and hauling with a Sauerman Machine sized to match your plant capacity. Track cable Drag-Scrapers dig from high banks, dry pits and deep water. They are built in sizes up to 15 yds. and operate economically on 1000-ft. spans. Start reducing your operating costs—write or call and tell us your job requirements.

After discharging load into field hopper, DragScraper is lifted from pile for return to pit. Conveyor at left leads to plant.

This Sauerman two-drum hoist controls operation of DragScraper.

SAUERMAN BROS., INC. 622 SO. 28th AVE. BELLWOOD, ILL.

Linden 4-4892 • Cable CABEX—Bellwood, Illinois

Crescent DragScrapers • Slackline and Tautline Cableways • Durolite Blocks

RECOGNIZE THIS LOT?

It's the lot of a Caterpillar Dealer, one of over 300 in the U. S., offering you the best buys in used equipment!

No matter what you want in used equipment, no matter what the price range, your Caterpillar Dealer is headquarters for your best buy. No other dealer offers you "buys" with this protection:

BONDED BUY

1 **A "BONDED BUY"** up to $10,000 on used Cat-built equipment—your guaranteed assurance of satisfactory performance on *all* parts of the machine during the guarantee period.

2 **A "CERTIFIED BUY"**—his written guarantee covering units of any make.

3 **A "BUY AND TRY"** deal—his written money-back agreement on units of any make.

For the best buys in your area, to be *sure* of what you're buying, see your Caterpillar Dealer. You'll find him listed in the Yellow Pages!

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR

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BEST BUYS IN NEW AND USED EQUIPMENT

News . . .

Continued from page 50

1955 by the Board of Water Supply. Experience and know how gathered during this earlier construction have been carried over to the more extensive West Delaware job.

Instead of forming the conventional arched tunnel brace, using rib steel supports, roof bolts are inserted directly into the interior carved rock surface—to permanently tie overhead strata into a secure mass. As in mine tunnels, the roof bolts literally stud the whole roof area, each placed but a few feet from others around it. Upon completion, a roof-bolted section is immediately ready for the installation of forms for the tunnel's concrete lining. This, according to the West Delaware Tunnel Constructors, one of the tunnel contractors, eliminates the highly dangerous, laborious and expensive procedure necessary with the use of rib steel supports—the removal of fallen rock and blocking between the ribbed braces and the rock surface.

A rib structure takes up a substantial amount of room, according to tunnel engineers. In contrast, roof bolts hug the rock surface of the tunnel throughout and provide more working space. In some installations, the roof bolts, closely spaced, are the sole means of roof support. In others, steel straps, fastened by the roof bolts, supplement the anchoring effect of the latter. Also, roof bolting materials require only a fraction of the storage space needed by the rib steel members.

Specifications for the new tunnel call for the use of one-inch diameter split wedge bolts and ¾-in. diameter, high-tension expansion shield bolts. Both types are capable of sustaining a 40,000-lb. pull in hard rock, according to Republic Steel Corp., a leading supplier of the bolts. Roof bolts are securely fastened in the tunnel roof to a minimum depth of six feet where they are tightened with approved calibrated torque or impact wrenches. In place, each bolt must be tightened to at least 200 foot-pounds of torque.

When completed in 1961, the tunnel will form a new link in the New York City water supply system connecting the Cannonsville Reservoir (currently under construction) to the Rondout Reservoir. It will measure 11 feet 4 inches in diameter and cut through fairly uniform strata of Devonian shale and sandstone. Although prone to fracture, the finely bedded shales are held securely in place by the roof bolts.

Sections of the West Delaware Tunnel are being constructed simultaneously under five different contracts, two of which are being fulfilled by the West Delaware Tunnel Constructors. The MacLean-Groves Co., Inc., and Geo. M. Brewster & Son are completing one contract, while a joint venture of Winston Brothers Co., Conduit & Foundation Co., Grafe-Callahan Construction Co., Tecon Corp., and Johnson, Drake & Piper, Inc., are working two contracts.

New York City's West Delaware Water Tunnel is being bored with the aid of roof bolts. Each bolt is driven to a depth of 6 feet and will sustain a 40,000-lb. pull-out.

Special report to Caterpillar D8 Tractor owners:

CAT CATERPILLAR

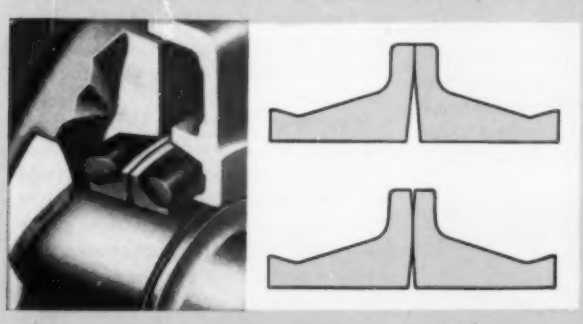
Parts you can trust.
Dependable round-the-clock service.

NOW—YOU CAN EQUIP YOUR D8 WITH LIFETIME LUBRICATED ROLLERS

AVAILABLE FOR 2U, 13A, 14A AND 15A MODELS

Forget about lubrication . . . and seal replacement. They're eliminated by this new concept in roller design and performance. The new lifetime lubricated rollers are lubricated when installed on your tractor. They'll never need lubrication until the rollers are disassembled for rim and flange rebuilding. The seals do not leak even after thousands of hours of operation. Seals won't need replacement when rollers are rebuilt. Another advantage—*oil* lubricant rather than grease is used because oil dissipates heat faster. Rollers operate at cooler temperatures. Bearings last longer.

New floating ring seal . . . wear does not decrease efficiency. The roller seal employs two metal alloy and two rubber "O" rings. The metal rings, much harder than file steel, have



lapped faces . . . smoother than glass. These faces taper slightly toward the inner edge forming a sealing area at the outer edge. As wear occurs, the sealing area moves inward, maintaining a perfect seal through thousands of hours.

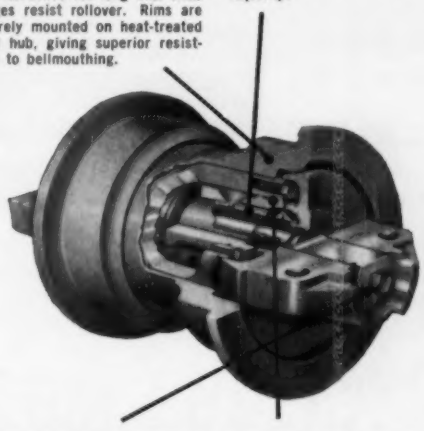
The "O" rings keep constant pressure on the metal rings. Lubricant can't get out. Grit can't get in. There are no springs or diaphragms to weaken, wear or become damaged. "O" rings are made of special compound to resist oil, heat and cold.

Millions of hours of proof—the toughest track roller yet. Cat lifetime lubricated rollers have been subjected to extensive and exhaustive on-the-job tests *for over 5 years*. Working under all types of job conditions, these time-tested rollers have proven unequalled. Their success is further amplified by new machine owner reports—for low-cost performance and minimum maintenance, Cat lifetime lubricated rollers can't be beat.

MANY OTHER NEW FEATURES THAT EXTEND TRACK ROLLER LIFE

RIMS – made from forged steel. Deep-hardened for long life. Wide flanges resist rollover. Rims are securely mounted on heat-treated steel hub, giving superior resistance to bellmouthing.

BEARINGS have high load carrying capacity.



LARGE DIAMETER SHAFT is double heat treated, making it extra stiff and resistant to wear.

BUSHINGS contain large oil reservoirs for more lubricant and better cooling.

Easy installation is achieved by use of snap rings to hold the seals and end collars in position before mounting. End collar bolt holes will line up easily with track roller frame holes during installation.

Stop track roller greasing now with these lifetime lubricated rollers. See your Caterpillar Dealer. He will give you the complete story on this time-saving, money-saving undercarriage component.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR

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SERVICE TIP: When rebuild time finally comes, be sure to keep the metal rings matched in original pairs, being careful not to nick or mar the lapped faces.

Equipment You Ought to Know About

Portable Compactor

Manufacturer: Racine Hydraulics & Machinery, Inc., Department EE, 2000 Albert St., Racine, Wis.

Claims: Safety, versatility and easy maintenance are characteristics of the Rapak self-propelled, one-man earth compactor.

The self-contained unit requires no auxiliary equipment, with resultant handling ease and safety for the operator. One-shot lubrication and simplicity of design hold maintenance to a minimum.

The Rapak is powered by a 4-cycle, 3-hp gas engine and has an adjustable rate of from 400 to 600 blows per minute. It operates in either cohesive or granular soils, and will compact cohesives through granular soil to over 100% Proctor density.

Interchangeable shoes give the compactor a range of working widths from 6 to 18 inches. It is the only self-propelled unit to offer extensions for greater depths, it is claimed. These features make it highly useful in confined and inaccessible areas.

The new compactor has a wide variety of earth-tamping uses in the construction, excavation, gas and electric utility, industrial and petroleum development fields.

Pump Strainer

Manufacturer: Megator Pumps & Compressors, Inc., Department EE, 930 Manchester Ave., Pittsburgh 12, Pa.

Claims: Dolphin floating suction strainers are designed to improve performance of pumps that draw from streams, ponds and sumps, or are employed for de-watering mines, quarries and excavations.

It solves the problem of drawing water from just below the surface to avoid drawing in either sand or silt from the bottom, or floating matter from the surface.

Another problem for which the floating Dolphin strainer promises a solution is the tendency for air to be entrained into the pump suction due to vortex formation. In the case of an ordinary centrifugal pump this phenomenon can, and frequently does, put the pump completely out of action.

The ordinary type of strainer, which sinks to the bottom, not only allows fine solids to be drawn into a pump causing a considerable amount of wear, but, owing to its weight, it invariably gets buried, sometimes completely, thus blocking the suction line.

The Dolphin strainer is light and compact, and is readily fitted to the end of the suction hose. It is made in four sizes, for 1½, 2, 3 and 4-in. hoses.

The float chamber of the unit is filled with a moulding of expanded polystrene "foam," which provides millions of separate water-tight air cells so that buoyancy cannot be lost as a result of accidental damage.

The design of the Dolphin strainer is ideally suited to conditions where there

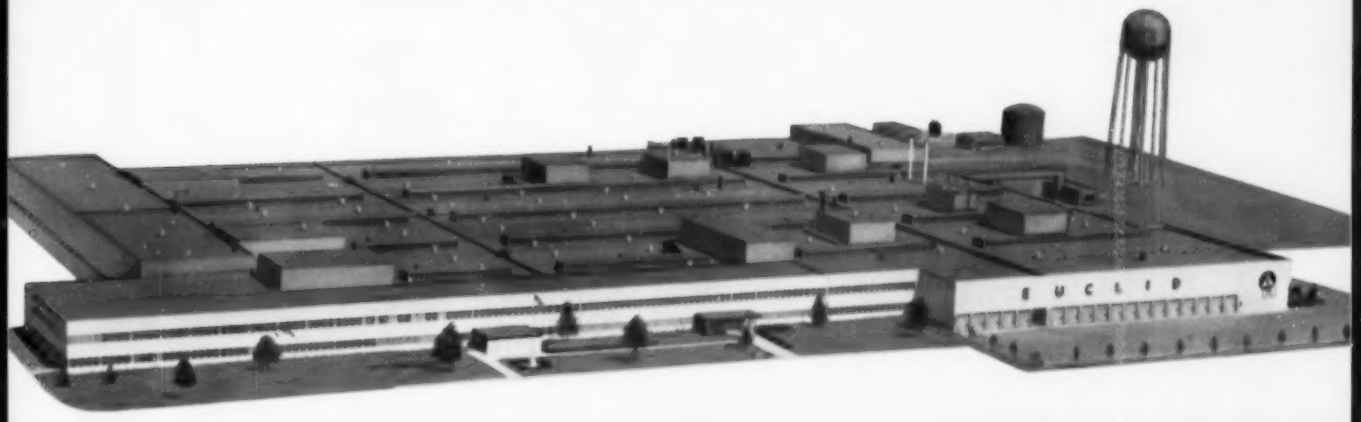
Continued on page 59

BIG CRAWLER TRACTOR NEWS FROM EUCLID!

C-6 Crawler now in production at Euclid's new tractor plant

A new concept in crawler tractor design, the Model C-6 is the most recent addition to the modern line of Euclid equipment developed and job proved during the past 5 years. Like the big twin-power TC-12 tractor, as well as 5 new scraper models and 4 new rear-dump haulers, the C-6 has the power, speed and versatility to get more work done faster and at lowest cost. All of these new "Eucs" incorporate years ahead engineering that has been a major factor in maintaining Euclid's leading position in the construction equipment industry for many years.

Now a big modern plant at Hudson, Ohio, designed exclusively for the manufacture of Euclid crawlers, is in production on Model C-6 and TC-12 tractors. Here every facility is provided to assure a uniform high standard of product quality that pays off in dependable long life performance of Euclids on every job.



C-6 sets a new standard in 200 h.p. tractor class

Brand new in every way . . . in functional design, ease of operation, service accessibility and productive capacity . . . but a "veteran" of many thousands of operating hours on a wide range of actual jobs and thorough testing at the proving grounds. No other machine in Euclid's history has ever been so completely proved for productive capacity and long service life before the start of volume production.

With 211 net h.p. and job proved Torqmatic Drive, there's a smooth, steady flow of power to match the work load. Changes from any speed range to another and from forward to reverse and back again, are made under full power . . . there are 3 speed ranges in forward and reverse, with a top speed of 7.9 mph.

Dry type air cleaner, full hydraulic track tensioning, independently suspended track frames and final drives, rear mounted cooling system, fewer lube points, and "package" assembly of major components are some of the other C-6 features that make this "Euc" outstanding for easy servicing and maintenance.

Compare and prove for yourself...

THE "EUC" C-6 IS THE LONG-NEEDED "STEP AHEAD" IN CRAWLER DESIGN

When you check all the things that really count in crawler performance . . . easy operation, maneuverability, power and traction for tough work, and minimum downtime . . . you'll see why the new C-6 is your best investment in the 200 h.p. class. No matter what the job is . . . heavy dozing and ripping, push-loading big scrapers, pulling heavy loads, stripping, land clearing, or handling stockpile assignments . . . the versatile C-6 cuts costs and gets more work done faster.

The Euclid dealer in your area will be glad to show you why the C-6 is your best bet for increased production at lowest overall cost.

EUCLID

DIVISION OF GENERAL MOTORS
Cleveland 17, Ohio

EUCLID (GREAT BRITAIN) LTD.
Lanarkshire, Scotland

. . . a complete line of equipment for heavy earthmoving, mining, logging and many industrial operations . . .

Printed in U.S.A.

Continued from page 54

is not sufficient depth of water for it to float, as in mines and excavations where the object is to keep the water as low as possible. When the pump is working under these "snore" conditions, it still tends to keep its upright position regardless of twisting of the hose. The bottom of the strainer is flat and all the entry holes are in the sides.

The entire strainer is constructed of plastics and austenitic stainless steel, so that it is practically immune to corrosion.

Dragbucket Line

Manufacturer: Williams Bucket Div., Wellman Engineering Co., Department EE, 113 St. Clair Ave., N.E., Cleveland 14, Ohio.

Claims: Williams offers a completely new line of dragline buckets for light and general purpose service, including levee and swamp work, irrigation ditching and sand and gravel operations.

Lip, bottom scoop-plate and skid runners have been replaced by a heavy one-piece bottom, resulting in extremely smooth interior and exterior surfaces for fast digging and instant dumping. The simplified construction also reduces maintenance.

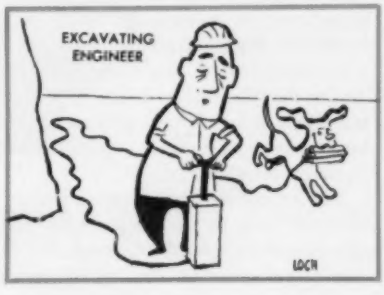
Known as Williams type DC buckets, the new models are available in sizes ⅜ through one cubic yard, with or without perforations.

Long-Load Truck

Manufacturer: White Motor Co., Department EE, 842 E. 79th St., Cleveland 1, Ohio.

Claims: A uniquely-engineered truck that is practically all deck, with its one-man cab taking up only 5.6% of the truck's overall area, solves specialized materials handling problems for J. T. Edwards Co., Columbus, Ohio.

A specialist in structural steel, Edwards wanted a compact truck to haul long lengths of steel, wood and other materials for around-town deliveries, as well as in plant-to-construction-site jobs.

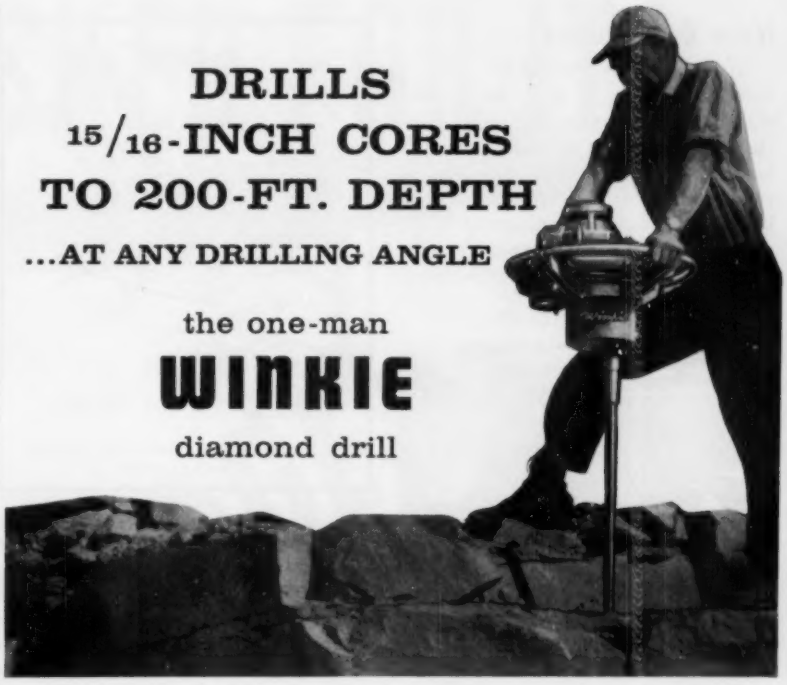


For the task Edwards is using a White Motor truck with more than 195 square feet of flatbed deck, including a 28½-ft. length gained through extension of the deck alongside the one-man cab, on only a 163½-in. wheelbase. The result is top maneuverability and load-carrying ability despite unwieldiness of the heavy materials being handled. Ed-

Continued on page 60

DRILLS
15/16-INCH CORES
TO 200-FT. DEPTH
...AT ANY DRILLING ANGLE

the one-man
WINKIE
diamond drill



So powerful, yet so portable — The new Bucyrus-Erie Winkie diamond drill weighs only 45 pounds, yet even in granite, the Winkie recovers 15/16-inch cores to depths of 200 feet. Maximum core diameter is 8 inches.

Low initial cost — The Winkie sells for half the cost of drills with equal capacity — is not limited to single purpose or a few drilling chores. The Winkie will take on almost any core or structural drilling job, finish it faster . . . cheaper . . . easier.

Lowest operating cost — The Winkie's easy-starting, 2-cycle, 5¼-hp gasoline engine will operate at full throttle, full load on less than a gallon of fuel per hour.

Whatever your job, the Winkie will give you greater footage per shift — for less cost — than any drill of comparable capacity. Write Dept. 21B59, Bucyrus-Erie Company, Drill Division, Richmond, Indiana, for complete details on the amazing big-capacity, lightweight Winkie.

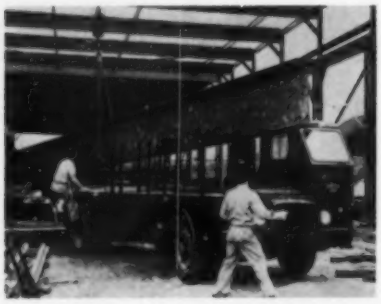
45 lb.
2-cycle, gasoline, air-cooled engine
5¼ hp @ 5000 rpm
Hardened helical transmission gears
Gravity and hand lever feed
Centrifugal clutch
2000 rpm max. bit speed
Height, 19 in., Diameter, 21 in.

BUCYRUS ERIE®
BUILDS BETTER EQUIPMENT

New Equipment . . .

Continued from page 59

ward's truck has a deck 96 inches wide behind the cab and 62 inches wide alongside, providing an additional 22% loading space over standard trucks of comparable wheelbase. Called "Util-I-Deck," the truck has transported 40-ft. steel I-beams on special permit with only slightly more than 5-ft. overhang front and back.



The deck is 1½-in. thick, tough oak equipped with stakes. It can be loaded from above, either side, front or rear. The cab is protected by steel retaining walls against structural damage from payloads.

Powered by a 145-hp White 250A Mustang gas engine, the truck has a five-speed transmission and single-reduction rear axle with 6.17 to 1 ratio.

GVW rating of the Util-I-Deck used by Edwards is 28,000 pounds.

Power Shift Transmission

Manufacturer: Caterpillar Tractor Co., Department EE, Peoria, Ill.

Claims: Power shift transmissions, each of which features an exclusive new concept in the transmittal of tractor power, are now available on Caterpillar D8 and D9 tractors.

The new transmissions provide instantaneous, one-lever control of gear shifting without interruption of power and momentum.

The arrangement of planetary gears combines the best features of both direct drive and torque converter power trains. Heart of the power-tailoring arrangement is a planetary gear set, driven integrally by the engine flywheel. The gear set transmits ⅓ of the engine torque directly to the transmission input shaft, and the remaining engine torque through the torque converter.

On the operator's deck, one range selection lever now takes the place of the flywheel clutch lever, gear selection lever and forward-reverse lever. Only a fraction of a second is required to shift the power shift transmission, as against a shift time up to several seconds for standard transmission.

Shifting ease insures the matching of tractor speed and power to machine load. The machines can be shifted on the move under full load; then instantly reversed to a high return speed to begin another work cycle.

Caterpillar terms its split-path transmission design "precedent-setting." By directing a portion of engine torque straight to the transmission input shaft, it provides higher overall efficiency than a standard torque converter drive and retains the solid feel of direct drive tractors. This design feature also retains the impact force necessary in stumping and ripping operations.

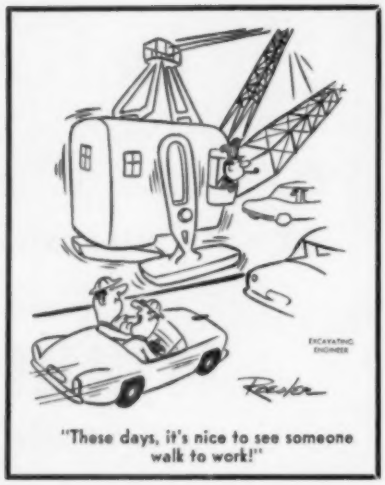
The remainder of the engine power is directed through the torque converter, allowing the tractor to automatically adjust travel speed to load, as on normal torque converter drive machines. Additionally, engine stalling under heavy lug conditions is reduced. The interaction of the mechanical and torque converter drives also reduces the tendency of the machine to lunge when suddenly releasing a load. This combination provides high efficiency over a broader range than standard torque converter tractors, and provides audible indication that the engine is being lugged when run close to stall conditions.

In pushloading applications, the power shift allows the machine to approach the scraper at high speed, down-shift to intermediate range to provide fast loading speed for the initial stages of loading, drop to low range as the load builds, then shift up through intermediate and high range to assist the scraper in leaving the cut.

Simultaneously with the introduction of the power shift transmission for the D9 tractor, Caterpillar has announced the availability of a new series D9.

Designated the D9 series E tractor, the new unit will be available in a choice of direct drive or torque converter drive, as well as the power shift version.

The addition of a more efficient turbocharger contributes to an increase in machine horsepower—now up to 335 hp, compared to the previous 320. Dimensionally, the new series E machine is 1 7/16 inches longer, an inch higher, and of the same width as its predecessor.



"These days, it's nice to see someone walk to work!"

45-Ton Mobile Crane

Manufacturer: Manitowoc Engineering Corp., Department EE, Manitowoc, Wis.

Claims: Manitowoc's new model 2800 mobile crane is capable of handling a safety-rated 45-ton capacity load at 15-ft. radius. The unit converts easily and quickly into a clamshell or dragline.

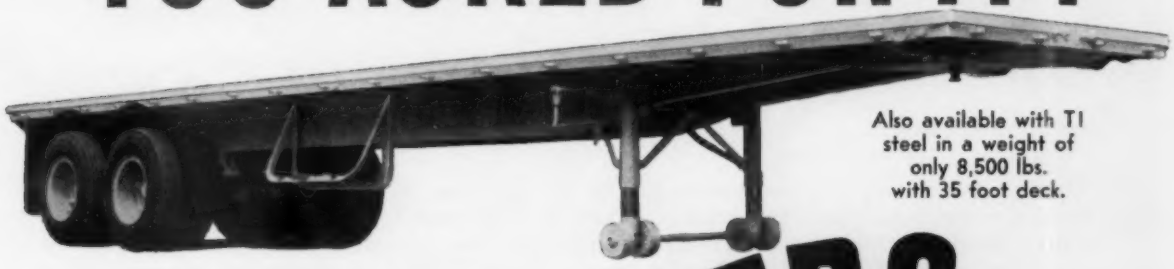
The basic lightweight welded alloy steel boom is 40 feet long, with pendant type rigging and an open-throat boom point as standard features. Long booms for extra reach on "high iron" jobs are available. Also available is an adjustable cantilever jib in lengths up to 50 feet.

The 2800 carrier is matched to the crane upper works and has quality, long-life components. Features include dual tandem rear and single tandem front axles; rigid, massive, removable outrigger side-frames; full-time power steering; ample clearance over rough or soft ground; air brakes; and strong, aluminum alloy outrigger pads.

The upper works offers independent

Continued on page 64

YOU ASKED FOR IT!



Also available with T1 steel in a weight of only 8,500 lbs. with 35 foot deck.

SO! ...here's the ROGERS HIGH-FLAT

Persistently for years, from various sources, have come requests for Rogers Brothers to build high-flat trailers.

Finally they have yielded and produced a trailer that meets every need and is worthy of carrying the Rogers name.

In keeping with Rogers consistent policy, these trailers have been so designed to give maximum performance and so constructed to assure long service with minimum maintenance.

Factors include: proper proportioning and balance, resilient springing, dependable braking and the use of a newly developed framing steel.

The spring mounted bogie has been proved in thousands of miles of gruelling service.

The liberal sized, reliable brakes are of time-tested Rogers design.

Of special interest is the T1 frame steel — a new product combining the strength of high quality steel with uncommon lightness.

No longer need truckers haul excessive dead weight to obtain required strength in their high-flat trailers.

Get complete information from your Rogers distributor or contact the factory directly. Use the coupon.

FILL IN — CLIP OUT AND MAIL

ROGERS BROS CORP.
Albion, Penna. Date_____

Send literature and complete information regarding HIGH-FLATS.

Name_____

Company_____

Street Address_____

City_____

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ALBION, PENNSYLVANIA

Experience Builds 'em ROGERS Heavy Duty Transport Trailers Performance Sells 'em

EXPORT OFFICE: 50 CHURCH STREET
NEW YORK 7, N. Y., U. S. A. Cable Address: BROSITES

How would you load rock this size?

Shoot to size? Cable and lift? Shovel?

There are only two tractor shovels in the business built for work like this . . . the Allis-Chalmers 225-hp, 4-yd HD-21G and the 150-hp, 3-yd HD-16G. They're in a class by themselves. If you move ore, rock, gravel or overburden . . . if you need a machine that will pioneer, rip, load and handle a multitude of jobs, see them in action. They'll go it alone or team up with other machines to help improve your profit.

Increase bidding power—You're way ahead in bidding flexibility with a big-capacity tractor shovel. Jobs miles away are simple transport operations with Allis-Chalmers BIG tractor shovels. Forget about expensive dismantling, problem loading, hauling and setup again at job site.

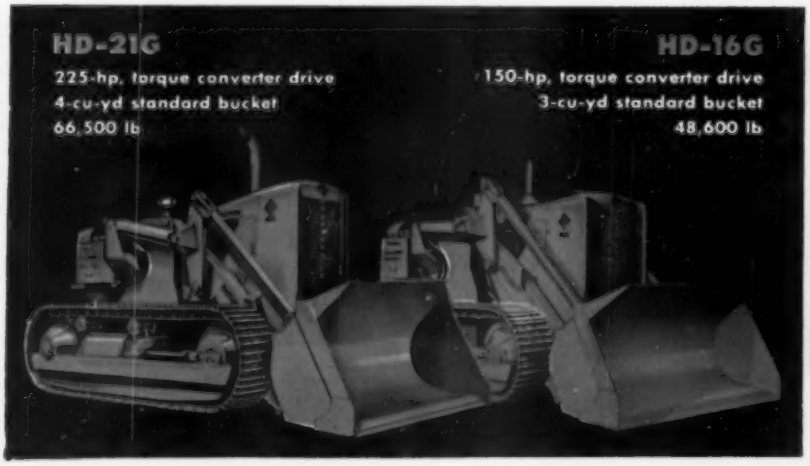
Handle scattered jobs economically—*Wherever* there's loading to do on a new job, these two dependable units "walk" to work . . . through mud—over rough terrain—those spots where *only crawlers* can go! They build their own roads—dozing, cutting, filling, compacting . . . load up to 4 yd at a clip*

What's more . . . BIG HD-21G's —16G's are not single-purpose units. They're pioneering machines. They'll open up new cuts or make quick work of clearing, piling stumps, brush or boulders. And, of course, loading, stockpiling and cleanup are their steady specialties.

They're ripping specialists—Long track, outstanding balance and power enable HD-21G's—16G's with rear-mounted Tractomotive rippers to open up tough material over *two feet deep*. Enough hydraulic penetrating pressure is developed to lift the tractor itself off the ground.

You *can afford* to use these big tractor shovels on many utility chores —from breaking up concrete roadbeds with 72,700-lb break-out force, to complete one-man, one-machine demolition operations. When you apply the abilities of the HD-21G—HD-16G to your own jobs, you'll see how either one or both of these production units can cut costs . . . put a *sharper point* on your favorite bidding pencil.

See your Allis-Chalmers dealer—He's the ONLY man with tractor shovels from 72 to 225 hp . . . from 1½ to 7¼ yd. He'll be happy to fill in the details—show you an Allis-Chalmers tractor shovel in action. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wis.



*Special-purpose buckets available up to 7¼ yd.

Walk to work—This Allis-Chalmers HD-21G makes its own way to rugged, inaccessible working areas . . . can "walk to work" where *most* units with 4-yd capacity would have to be brought in piecemeal.

. . . move ahead with ALLIS-CHALMERS

Big Allis-Chalmers tractor shovels are built to handle rock this size with ease and durability. Watch one work—or ask the man who owns one about the *capacity, versatility,* and *easy transport* they offer . . . *three* of the most desirable profit characteristics you'll ever find in *any one machine!*

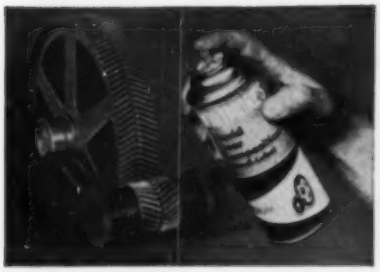
One-machine fleet—HD-16G handles everything on building removal projects like this. Tearing down the old, loading out scrap, fine-grading in preparation for the new.

No problem loading—Moving from job to job quickly with the HD-21G and HD-16G adds even more value to these two heavy-duty tractor shovels.

A-C . . . . . power for a growing world

TRIAL SAMPLES

Of World-Famous WHITMORE'S Lubricants NOW IN AEROSOL SPRAY-ON CANS!



HANDI-LUBE LIQUID GEAR COMPOSITION

For open gears, sliding surfaces—exclusive formulas eliminate metal to metal contact, keep wear on the lubricant not the metal—no breakdown even after prolonged use under water—available for every climatic condition—packaged in handy 16-oz. aerosol spray-on containers or in bulk containers—send for a free trial sample.

WIRE ROPE SPRAY LUBRICANT

Exclusive formulas for lubricating and protecting wire rope, chain, springs. Penetrates to the core of wire rope minimizing internal friction and increasing usable life up to 300%—special protective qualities absolutely eliminate corrosion—non-gumming qualities reduce "carry-back"—packaged in handy 16 oz. aerosol spray-on containers or in bulk containers—send for a free trial sample.

65 YEARS OF LEADERSHIP LUBRICATING THE FOLLOWING:

- Open Gears, Dipper Sticks, Cams
- Enclosed Gear Cases
- Wire Rope and Cable
- Hydraulic Units, Torque Converters
- Roller, Ball, and Sleeve Bearings
- Speed Reducers

Est. 1893

THE WHITMORE MANUFACTURING CO.

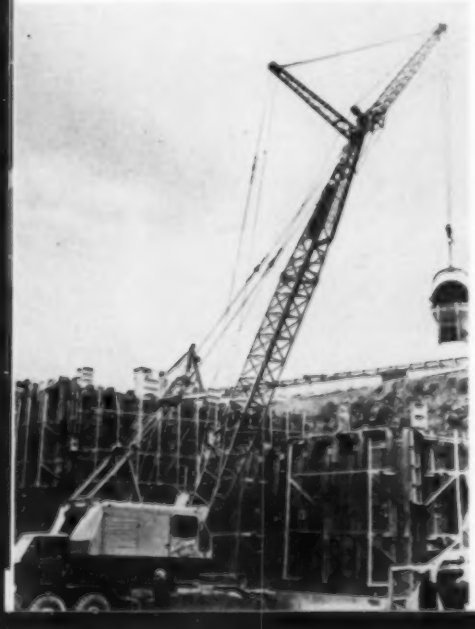
LUBRICATING ENGINEERS

CLEVELAND 4, OHIO, U.S.A. PHONE: VULCAN 3-7272

New Equipment . . .

Continued from page 60

boom hoist; disc-type swing clutches; manual brakes; single-point brake and clutch adjustments; choice of gasoline or diesel engines; and hydraulic torque converter. An optional feature is an ample 5,000-lb. capacity third drum for handling of "sucker line" work.



For quick moves on the job and between jobs, pin-connected booms speed takedown. Outriggers and counterweights (rear and front) are self-removable by the crane. "Removable outriggers" permit weight reduction of over 5 tons if desired. An optional one-joint boom hinge allows the boom to be folded under for short trips.

Turbocharger

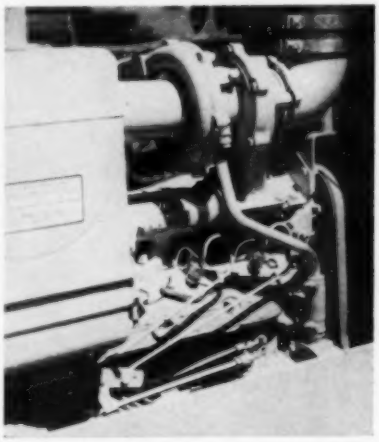
Manufacturer: International Harvester Co., Department EE, 180 N. Michigan Ave., Chicago, Ill.

Claims: The smallest turbocharger now in production—no larger than a salad plate and weighing only 24 pounds—has been developed for use on the new International TD-9 crawler tractor.

Fitted to the recently-announced International D-282 six-cylinder diesel engine, the 7¾-in. diameter turbocharger boosts power output by 23% over that of a naturally-aspirated engine.

The advantages of turbocharging—more power and fuel savings—are available for the first time in a small crawler tractor through the miniature turbocharger.

In a turbocharging operating, exhaust gases formerly wasted are harnessed to increase the volume of air fed into the engine, so greater quantities of fuel can be burned more efficiently.



This small turbocharger accomplishes this by supplying compressed air to the engine intake manifold. The unit consists of a single-stage centrifugal compressor mounted on a common shaft with a single-stage radial inflow turbine, a one-piece main housing, a turbine housing and a compressor housing. The turbine wheel, which drives the compressor impeller during operation, is actuated by the engine exhaust gases.

The turbocharger was developed by the AiResearch Industrial Division of the Garrett Corp., Los Angeles, Calif., and International Harvester.

Long Dump Trailer

Manufacturer: Hercules Steel Products Co., Department EE, Galion, Ohio.

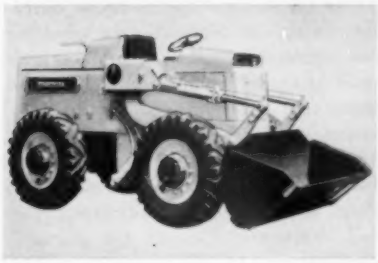
Claims: An extra-long Hercules dump trailer affords haulers the security of a full-frame trailer, yet substantially reduces deadweight to meet bridge laws imposed by individual states.

Several units of this design have already been placed in service in Minne-

sota, where they make a 150-mile trip from Duluth to Minneapolis.

The 28-ft. steel bodies are mounted on a 31-ft. chassis to obtain a maximum legal payload of 43,000 pounds. The dump bodies, which are of corrugated steel construction to minimize weight and still maintain structural strength, are also available in aluminum models for even greater weight savings.

5,000-Lb. Capacity Loader



Manufacturer: Frank G. Hough Co., Department EE, 708 Seventh Ave., Libertyville, Ill.

Claims: Hough has announced a new four-wheel-drive, rubber-tired tractor shovel with 5,000-lb. carry capacity—the model H-50. This loader is already in production and will replace the model HU Payloader.

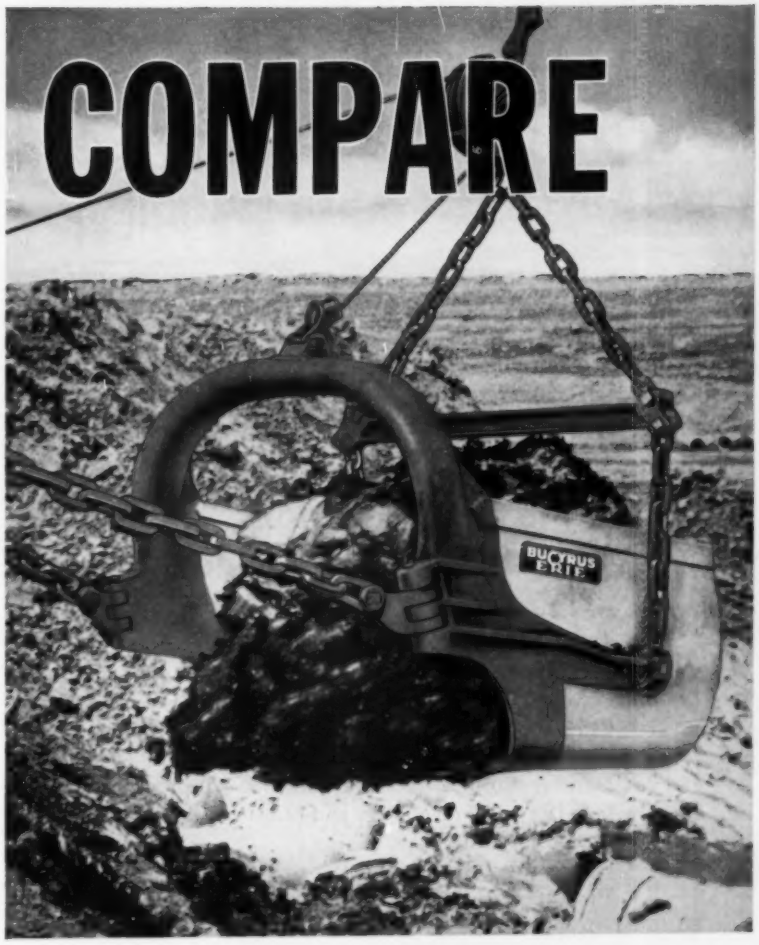
Features of the new H-50 include more power available for both hydraulic system and traction, more efficient torque-converter, power-shift transmission, power-transfer differentials, power-steering, pry-out bucket action, safety boom arms, power-boosted brakes and numerous refinements. The new and more powerful gasoline and diesel engines provide from 90 to 92 hp.

To assure ample protection of the engine in dusty conditions, the H-50 has a large-capacity oil-bath air cleaner. A cartridge-type oil filter is built into the hydraulic reservoir. Similar filters protect the engine oil, and the transmission and torque-converter oil. The front service brakes are sealed to keep out dust, dirt and foreign matter.

The torque-converter in the model H-50 is closely matched to engine and transmission characteristics. It is a single-stage, two-phase converter with a torque-multiplication factor of 2.57 to 1 at stall.

The Paylomatic power-shift transmission, designed and built by Hough, provides three speeds in each direction. Fingertip shifting up or down in either direction, without "foot-clutching" or stopping for a range shift, gives fast operating cycles. Power-transfer differ-

Continued on page 66



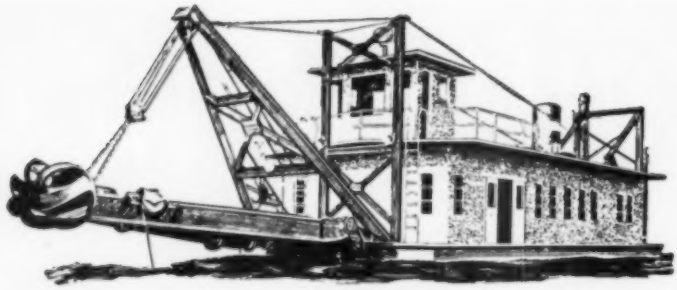
...and you'll buy BUCYRUS-ERIE

compare output Watch the "slicing action" lip take a faster bite, regardless of material . . . watch the tapered basket fill smooth and fast . . . watch it ride through the swing, smooth and even without bobbing and spilling . . . and watch the high-speed dump made possible by a clean inside design and high arch!

compare economy Ask others about long-life Bucyrus-Erie buckets! BECOLOY — a specially developed Bucyrus-Erie alloy — not only makes the buckets lighter, but adds great strength and wearing ability with higher impact resistance.

Your Bucyrus-Erie distributor will give you complete information on the complete line, all types, including solid and perforated; light, medium and heavy-duty. Call him today, or write Bucyrus-Erie Co., South Milwaukee, Wisconsin, Dept. 1RE.

BUCYRUS ERIE® Builds Better Equipment



Dredging problem? Investigate

ELLICOTT DREDGES

Ellicott offers you—

—standard portable "Dragons" or custom-built heavy-duty dredges

—three-quarters of a century of dredging progress

—pioneering in dredge design

—superior engineering service

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—undivided responsibility for dredge performance

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Typical Ellicott jobs include:

- Channel and harbor improvement
- Canal digging and maintenance
- Land reclamation for real estate development
- Desilting and reservoirs and plant ponds
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For engineering recommendations on any dredging problem, write:

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Subsidiaries: Dragues Ellicott France, Paris, France; Ellicott de Mexico, Mexico City, Mex.; Dragas Ellicott do Brasil Ltda., Rio de Janeiro, Brazil; Ellicott Fabricators, Inc., Baltimore, Md.; McConway & Torley Corp., Pittsburgh, Pa.

Successors to the floating dredge business of the Bucyrus-Erie Co. and the American Steel Dredge Co. Complete engineering sales and repair parts service.

New Equipment . . .

Continued from page 65

entials, which automatically shift additional torque to the wheels with the best traction, continue as standard equipment on both front and rear axle assemblies of the H-50 Payloader.

Vibrating Compactor

Manufacturer: Essick Mfg. Co., Department EE, 1950 Santa Fe Ave., Los Angeles 21, Calif.

Claims: Compaction on soil equivalent to a 16-ton static weight roller is provided by the new Essick VR-13-W vibrating compactor. The new 13-in. self-propelled high frequency vibrating compactor is designed to provide compaction in close quarters of trenches, ditches around foundations, and in almost inaccessible backfilling operations. It fills the need for high density requirements in confined areas, and being self-propelled, it requires only guidance by the operator.

The VR-13-W is equally capable of high density asphaltic compaction for highway maintenance and patching.

The unit has a 4.8-hp air cooled engine. A separate clutch allows operation with or without the vibrating mechanism engaged. The unit propels itself at up to 1 mph in either forward or reverse direction. The unit is 16½ inches wide, 73 inches long (overall), 37 inches high, and weighs 630 pounds. For asphalt use, the VR-13-W can be ordered with a sprinkler tank, spray bars and cocoa mat.

Salamander

Manufacturer: Nugent Corp., Department EE, 4400 Superior Ave., Cleveland 3, Ohio.

Claims: The Nugent oil-burning salamander features high quality workmanship and materials. It has a 24-gauge hot-dip galvanized steel heater bowl that resists rust. Fuel oil capacity is 10 gallons.

Among its features are alloyed cast-iron elbow to increase the life expectancy; riveted bracket clips; new two-piece stack to cut repair and storage cost; heavy diffusion hood and brackets; and positive lock-down handles to prevent accidents.

Rubber Chute Lining

Manufacturer: B. F. Goodrich Industrial Products Co., Department EE, Akron, Ohio.

Claims: A bed of velvety soft rubber strips has taken the bite out of one of industry's most highly destructive abrasive materials.

Sharp pieces of copper ore in slurry wear through unprotected metal chutes within days and destroy conventional rubber chute lining in less than a year. Yet, the same abrasive slurry has failed to produce any sign of wear on a new type of rubber chute lining in daily service for more than three years.

The new B. F. Goodrich chute lining is known as "Rifflestrip." The material represents a new engineering approach to the problem of protecting steel or wooden chutes from the ravages of abrasive materials, according to Goodrich.

The Rifflestrip bed is developed from any number of individual L-shaped, 2-in. strips of pure gum rubber. The strips are placed together tightly with the riser of each L-shaped strip forming a series of parallel ridges across the chute. The ¾-in. rubber base of each "L" section forms a continuous protective liner for the chute. The strips are then nailed to wooden chutes or bolted to metal chutes.

Once the Rifflestripped chute is in use abrasive material immediately fills the grooves between the ridges. From there on, the abrasive material runs over itself, and has nothing to abrade but itself.

The new lining encourages broader use of wooden chutes, where the strength of wood is sufficient, for conducting abrasive materials. A wooden chute lined with Rifflestrip will outwear expensive metal chutes protected with conventional rubber linings, Goodrich says.

Rifflestrip is recommended for chute lining, launders, hoppers and other wearing surfaces handling ore, sand or gravel; on systems handling slimes or tailings; and on mixing tubs handling abrasive, dry battery mixtures. Users can install the lining without waste since the standard 6-ft. length can be cut easily and butted without impairing performance.

Mobile Crane

Manufacturer: Thew Shovel Co., Department EE, Lorain, Ohio.

Claims: A new 80-ton model has been added to the Lorain line of rubber-tire cranes. The new Moto-Crane is designated model MC-875. It contains the latest Lorain features including shear ball turntable mountings, two-lever Joy Stick air controls, square-tubular-chord boom and one piece cast steel carrier frame.

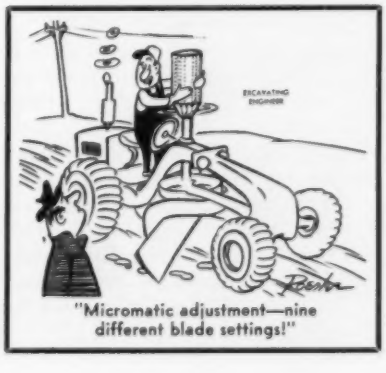
Lorain uses a square-tubular-chord boom design. Continuous round tubular lacing is welded to the chords at common points giving a "banding" effect that has far greater strength. Boom sections are pin connected for faster assembly. This machine handles up to 200 feet of boom plus 40-ft. jib extension, which is also of square-tubular-chord construction.

The turntable is mounted on the carrier by Lorain's shear-ball method—the only single ball-race design mounting on the market. Seventy hardened steel balls snugly sealed in hardened, precision-ground steel races take all the vertical, horizontal and radial loads and thrusts.

Joy-Stick air power controls are another Lorain exclusive used on this model. Only two hand levers are used to apply air to all turntable friction clutches. Metered air operation "feeds" air power to the clutches at any rate of flow and in any amount desired while

retaining the normal "feel" of all operations. Levers are moved forward, backward or side to side for fast responding single operations or to "quarter" positions for multiple, combined operations.

The backbone of the Moto-Crane carrier is a single piece box-section frame of alloy-steel casting, extending from the front bumper to the rear outriggers. Mounting plate, mounting pads and fore-and-aft outrigger boxes are all cast as an integral part of the frame. This type of construction gives added strength to resist the deflections and torsional stresses developed by the highly concentrated live loads of heavy-duty lifting crane service. Ten travel speeds up to 20 mph give exceptional mobility for this size machine.



"Micromatic adjustment—nine different blade settings!"

Don't spoil it.
KROIL it!
Don't ruin a valuable piece of equipment merely because some part is rusted tight. Apply KROIL, the amazing new chemical lubricant that creeps into millionth inch spaces (proved by laboratory tests), dissolves rust, supplies necessary lubrication and . . .
Loosens Frozen Parts
18,000 of America's leading plants can't be wrong. They have used KROIL for ten years and depend on it to save expensive labor and valuable parts. They say: "Kroil loosened bushings after a 12-ton press had failed" . . . "on repairing heat treat trolleys formerly destroyed every nut. Now Kroil saves them all, and time, too."
You too can get these results. Try KROIL on money-back basis.
Gallon, $4.00; with Kroiler squirt gun, $4.95, f. o. b. factory.
Ask for GENIUS AT WORK—a free publication full of ideas for maintenance men.
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FOR 50 YEARS...
Finest in the Field!
Rely on the bucket contractors rely on. The Omaha Dragline Bucket gives full load with every cast. Perfect balance makes it easy to spot dump. Alloy steel cutting teeth stay sharp, tough and ready. Strike pay dirt now! Complete information and specifications await your letter.
DRAKE-WILLIAMS MOUNT
• OMAHA, NEBR.
OMAHA
DRAGLINE BUCKETS

New Trade Literature

Subject: **Helicopter**

Content: Surveying, equipment and repair supply, and transport of supervisory personnel by helicopter are among the topics covered in a folder titled, *New Workhorse for Construction*. It describes the Hiller 305-hp 12 E helicopter. Photographs of helicopters at work in the field, brief performance specifications and information on charter operator services are also presented.

Where to get: Hiller Aircraft Corp., Department EE, 1350 Willow Rd., Palo Alto, Calif.

Subject: **Lift Crane**

Content: Features of the crawler-mounted model 4000 lift crane, which has a capacity of 125 tons at a 17-ft. radius, are described in a new Manitowoc catalog. These include a heavy, massive rotating base with huge hook and house rollers; a big, stable undercarriage; and long, wide-spread crawlers. Without extensive advance preparations or dismantling, the unit can be put on a standard railroad flat-car for fast moves between jobs. The crane has torque converter, double-drum boom hoist of the self-locking worm gear type, disc-type swingers, self-removing counterweight and manual or air controls.

Where to get: Manitowoc Engineering Corp., Department EE, Manitowoc, Wis.

Subject: **Pit Operation**

Content: How to get maximum production in rock, sand and gravel pits is described in a Caterpillar booklet, *Peak Performance*. The 8-page booklet illustrates the use of dozers, wheel tractors with scrapers and wagons, motor graders, Traxcavators, and power shovels in producing materials. Removing overburden, feeding hoppers, haul road maintenance and loading of trucks are considered. Ask for form number D920.

Where to get: Caterpillar Tractor Co., Department EE, Peoria, Ill.

Subject: **Small Excavator**

Content: A 12-page bulletin covers the crawler-mounted Bantam model C-350 crane-excavator. It describes and illustrates the complete line of Bantam front-end attachments as well as the various track sizes, side rails and wide extensions available. Four pages are devoted to standard and optional features found on the new C-350 upper unit, including heavy-duty drum shaft and swing assembly, all-new, heavy-duty turntable design, three types of boom hoists and multiple speed transmission. Ask for bulletin C-350.

Where to get: Schield Bantam Co., Department EE, Waverly, Iowa.

Subject: **Motor Graders**

Content: A well-illustrated, 16-page bulletin tells about the operational and design features of the L-W motor grader line. This line consists of seven models of graders ranging from 67 to 190 hp. Two models are offered with full torque-converter transmissions. Other L-W graders offer transmissions with 8 forward speeds, 4 reverse and 3 optional creeper speeds. Ask for form No. MG-155.

Where to get: LeTourneau-Westinghouse Co., Department EE, Peoria, Ill.

Subject: **Anti-Friction Lubricants**

Content: A Whitmore folder lists uses of two new anti-friction lubricating compounds said to have no melting or dropping point. It gives test data and performance characteristics of the lubricants which are of special interest to the earthmoving, mining and quarrying industries. The compounds provide constant protection to roller, ball and sleeve bearings or sliding surfaces in "hot" bearing applications, or in areas with high ambient heat.

Where to get: Whitmore Mfg. Co., Department EE, Cleveland 4, Ohio.

Subject: **10-Yd. Hauler**

Content: The Koehring model 100 Dumptor, a 10-yd. capacity off-road hauling unit, is described in an 8-page bulletin. The literature features on-the-job views, component parts blow-ups, and drawings to illustrate the machine's two-way controls. Ask for bulletin K-618.

Where to get: Koehring Div., Koehring Co., Department EE, Milwaukee 16, Wis.

Notes from the Manufacturers

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has announced several new appointments to sales positions. V. M. Holloway is appointed to the newly created post of general sales manager, construction machinery division. A. E. Dorn, who had been sales manager for the division, takes over the newly created function of manager of sales training, headquartering at the company's Springfield (Ill.) works. J. M. Haile, who was assistant sales manager of the A-C construction machinery division, is now assistant general sales manager, a newly created position. K. A. New is appointed manager of dealer development, another new position. Since 1957 he had been sales manager, eastern region.

Bucyrus-Erie Co., South Milwaukee, Wis., has designated Wright-Thomas Equipment Co., Charleston, W. Va., as a crane-excavator distributor. Wright-Thomas offers sales and service on ⅜ to 4-yd. convertible excavators and cranes; Transit Cranes with 10, 15, 25 and 45-ton capacity; and 5 to 12-ton Hydrocranes. The new distributor's territory includes all of West Virginia except Hancock, Brooke, Ohio and Marshall counties. The firm will not, however, handle Hydrocrane sales to deep mine operators. Wright-Thomas maintains equipment parts and servicing facilities at its plant, 5528 MacCorkle Ave., S. E., Charleston.

Cummins Engine Co. Inc., Columbus, Ind., has formed a new subsidiary company in Brazil. The new Brazilian subsidiary will carry the corporate title Motores Cummins Diesel do Brazil Ltda., with headquarters in Sao Paulo, Brazil. In the near future the Brazilian firm will begin

Continued on page 74

NEWS ABOUT THE DUMP BODY BUSINESS

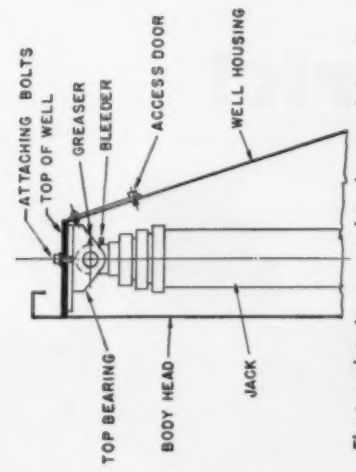
Increase Your Earning Power with MARION'S New Front End Hoist For 8, 9, 10 Foot Bodies

Another rugged and competitively priced Marion hoist is now available in three models for 8, 9 and 10-foot bodies. Outstanding features incorporated in the hoist provide time and performance saving benefits for all users.

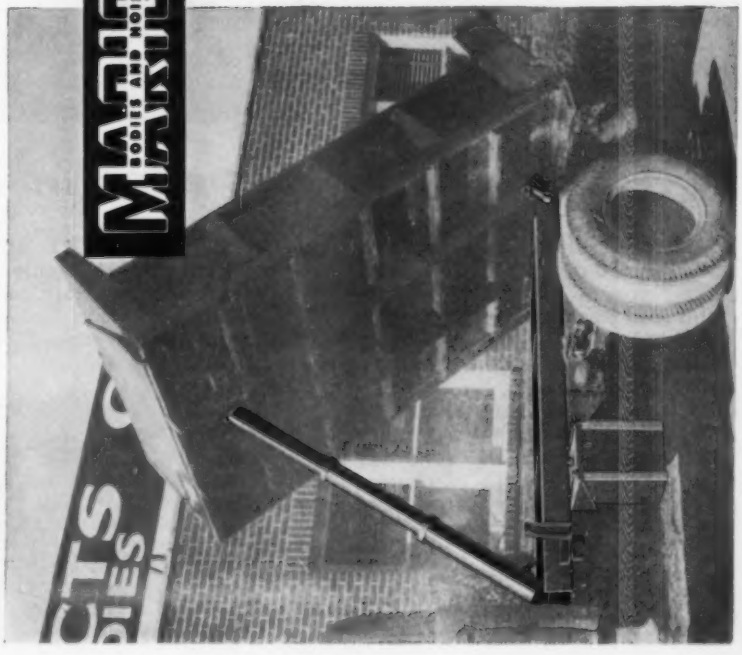
● The method of attaching the cylinder to the body speeds up installation and allows fast, easy detachment for any servicing in the field (see diagram). ● The deep oil reservoir, mounted on the side, provides a quieter, cooler, more efficient hydraulic system and eliminates the danger of drawing air into the system ● Weight savings from 65 to 270 pounds ● Fast dumping speed ● Pump with safety relief valve.

Write for a bulletin covering the three models, F-513T-65-72-82.

MARION METAL PRODUCTS CO.
Marion, Ohio, U.S.A.



The top plate is connected to the top of the cylinder before the body is installed. Then as the body is let down, the cylinder will guide itself into place in the cylinder housing. The body is then secured from the outside at the top by two bolts that fasten the body to the top plate.



Watch a BUCYRUS-ERIE transit crane at work!

Bucyrus-Erie Transit Cranes mount on 6x4, 6x6 and 8x4 carriers.

Discover the big edge in load control!

To make the right choice, *see* what these versatile machines can do. You'll see features in action that make Bucyrus-Erie Transit Cranes the best precision load handlers in the business.

As standard equipment, Bucyrus-Erie Transit Cranes offer you independent *power-controlled* lowering boom hoist for maneuvering the boom safely around machinery and pipe.

When you're working in a tight spot, setting up, you'll appreciate the friction swing brake that lets the operator hold both machine and load in the *exact* position you want, anywhere around the circle. There's no juggling for the next gear tooth . . . no jockeying of the swingers to hold steady.

You'll see many more features that make sense where safety and precision are concerned . . . where money and time savings are important.

WATCH A BUCYRUS-ERIE AT WORK! Your distributor will gladly arrange the demonstration at your convenience. See him for full details, or write Bucyrus-Erie Company, South Milwaukee, Wisconsin, Dept. 34EA.

BUCYRUS ERIE®

BUILDS BETTER EQUIPMENT

NOT in the Contract

The Florida beach and the blue sea looked inviting to the tourist from the North, but before venturing out to swim he thought he would make sure.

Tourist to guide: "You're certain there are no alligators here?"

Guide: "No'ssuh (grinning broadly): Ain't no 'gators hyah."

Reassured, the tourist started out. As the water lapped about his chest he called back: "What makes you so sure there aren't any alligators?"

Guide: "Dey's got too much sense. De sharks done skeered them all away."

As the little donkey left home to make his mark in the world, his mother tenderly said: "Good-bye, darling. Please try to make an ass out of yourself."

When John Smith opened a checking account at the bank, it was discovered that he could not write his name. It was agreed that he sign his checks "X X".

A few years later he hit the jackpot with some oil wells. He built a fashionable home and joined the country club. Sometime later, a check came through signed "X X X." When questioned by the bank president, Smith admitted it was his check. He explained, "Since the wife joined the country club she has gone high-hat, and she insists that I use a middle initial."

Vocational advisor to youth: "Your vocational aptitude test indicates that your best opportunities lie in a field where your father holds an influential position."

Sweet young wife: "Now over there we'll have a love seat, and over here we'll have a love seat, and over in the corner we'll have a love seat."

Tired groom: "My word, dear. Then why call this a living room?"

Sweet young wife: "Well, if that isn't living, I don't know what it is."

Traffic cop (producing notebook): "Name, please."

Motorist: "Aloysious Alastair Cyprian."

Traffic cop (putting book away): "Well, don't let me catch you again."

A wealthy contractor decided to go to church one Sunday. After services he approached the preacher with much enthusiasm.

"Reverend, that was a damned good sermon you gave."

Reverend: "I'm glad you liked it, but I wish you wouldn't use those terms in expressing yourself."

Contractor: "I can't help it, Reverend. I still think it was a damned good sermon, and I was so impressed that I put a hundred dollar bill in the collection."

Reverend: "The hell you did!"

A young matron resigned her secretarial job saying, "My reason will soon be apparent, and so will I."

"You've already had leave, Ferguson, to see your wife off on a journey, for your mother-in-law's funeral, for your little girl's measles, your boy's christening—what is it now?"

"I'm going to get married, sir."

The Texas gal had imbibed too freely at a hotel dance, ran outdoors, fainted and fell in a trash barrel.

A young man saw her, picked her up and carried her up to his room. In the morning he wired his partner in New York. "Close office. Sell everything. Come to Texas. They throw away better stuff here than you can buy in New York."

A man applied to the plant manager for a bookkeeping job.

"Where did you get your training?" he was asked.

"Yale."

"Splendid! What's your name?"

"Yohnson."

"May I have another cookie?"

"Another cookie what?"

"Another cookie, please."

"Please who?"

"Please, mother."

"Please, mother what?"

"Please, mother, dear."

"Hell, no, you've had six already."

"Here is a letter from your wife saying you are the father of a ten-pound boy."

"Does she say anything else?"

"That's all, except at the end of the letter she says, 'Truly yours.' "

"I'll take two."

TO ADVERTISE: All advertising in this section is payable in advance. Rate: $1.00 per line, or $12.00 per inch of 12 lines. Minimum charge $4.00. No discounts; no commissions. Please count your copy carefully to avoid delay. Each line contains 41 characters (34 characters is all capital letters are used). Count spaces and punctuation as one character each. Allow 18 characters for box number, if blind advertisement is desired. Be sure to enclose the correct amount of money with your order. Closing date—10th of preceding month. Example: January closes December 10th.

TO INQUIRE: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

LARGE SHOVELS, CRANES, DRAGLINES — 3 YDS. & UP

HEAVY
EXCAVATION EQUIPMENT

Draglines—Shovels—Cranes
Drills—Trucks

15-W Bucyrus-Erie elec. drag, 215', 13-yd.
9-W Bucyrus-Erie elec. drag, 160', 11½-yd.
9-W Bucyrus-Erie diesel drag, 200', 9-yd.
7-W Bucyrus-Erie elec. drag, 140', 7-yd.
7-W Bucyrus-Erie diesel drag, 140', 7-yd.
7400 Marion diesel drag, 175', 13-yd.
7400 Marion elec. drag, 175', 12-yd.
625 Page diesel drag, 160', 9-yd.
360-M Marion elec. drag, 175', 8-yd.
621-S Page diesel drag, 125', 7-yd.
200-W Bucyrus-Erie diesel drag, 125', 6-yd.
5-W Bucyrus-Erie diesel drag, 100', 6-yd.
2400 Lima dragline, 130', 5-yd.
4500 Manitowoc drag, 120', 5-yd.
120-B Bucyrus-Erie elec. drag, 115', 5-yd.
3900, 3500 & 3000 Manitowoc cranes.
111-M Marion drag, 100', 4-yd.
1601 Lima 4-yd. shovel/drag.
1055 P&H drag, 80', 3½-yd.
1201 Lima dragline, 85', 3-yd.
54-B Bucyrus-Erie drag, 80', 2½-yd.
5560 Marion 26-yd. elec. shovel.
550-B Bucyrus-Erie 25-yd. elec. shovel.
750-B Bucyrus-Erie 20-yd. elec. shovel.
1050-B Bucyrus-Erie 20-yd. elec. shovel.
5480 Marion 18-yd. elec. H.L. shovel.
151-M Marion 7-yd. elec. shovel.
170-B Bucyrus-Erie 6½-yd. elec. shovel.
4161 Marion 6-yd. elec. shovel.
120-B Bucyrus-Erie 4-yd. elec. shovel.
111-M Marion 4-yd. standard shovel.
54-B Bucyrus-Erie 2½-yd. standard shovel.
Large selection of smaller shovels and draglines available.
Model T-650 Reich truck mounted rotary and down-the-hole drill.
Euclid trucks—rear and bottom dump.
Truck cranes, dozers, scrapers, attachments.

FRANK SWABB EQUIPMENT CO., INC.
313 Hazleton Nat'l Bank Bldg.
Hazleton, Pa. **GLadstone 5-3658**

Used 5-W diesel walking dragline, 105' boom, 6-yd. Hendrix bucket, reported in good operating condition, price subject to purchaser's inspection $85,000, f.o.b. cars located in Southeast.
EXCAVATING ENGINEER
Box 3748
South Milwaukee, Wis.

Bucyrus-Erie 200-W diesel walking dragline, 125-ft. boom, 5-yd. bucket. S/N 762. Cooper-Bessemer FW-6 engine and complete electric light plant. Location western Pennsylvania.
EXCAVATING ENGINEER
Box 3750
South Milwaukee, Wisconsin

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

1 Completely rebuilt 54-B shovel #60317. $45,000.
1 Completetly rebuilt 54-B shovel #107758. $55,000.
THE W. I. CLARK CO.
Box 301 **New Haven, Conn.**

15-B Bucyrus-Erie hoe, S/N 59821, with UD-9 Int. engine, on tractor type tracks, reconditioned, at Houston, Texas.

22-B Bucyrus-Erie hoe, S/N 119144, Esco ¾-yd. dipper, UD-525 Int. engine, rebuilt, at Houston, Tex.

Model E Quickway dragline, S/N 5560, 25' boom, UD-9 Int. engine IHC L-184 tandem axle (single drive) truck, reconditioned, at Houston, Tex.

Model 55 Lorain shovel, S/N 4496, UD-14 Int. engine, at San Antonio, Tex.

C-35 Schield Bantam dragline, S/N 6377, Continental 6-cyl. gas engine, 30' boom, 16" shoes, ⅜-yd. Page bucket, at Houston, Tex.

TL-25 Lorain hoe, S/N 23276, Cat D315 engine, 22" shoes, at Houston, Tex.

15-B Bucyrus-Erie dragline, S/N 72928, at Dallas, Tex.

22-B Bucyrus-Erie dragline, S/N 106951, good condition, at Dallas, Tex.

T-35 Bantam truck crane, S/N 8098, 30' boom, at Dallas, Tex.

22-B Bucyrus-Erie combination, S/N 114274 clamshell, 45' boom, extra counterweight, tractor type tracks, Cat D318 engine, Blaw-Knox clamshell bucket, excellent condition, at Dallas, Tex.

Model 41, Lorain dragline, S/N 14432, good condition, at Dallas, Tex.

Model 25, Northwest dragline, S/N 11313, 40' boom, GM diesel, reconditioned, at Dallas, Tex.

Model 6 Insley dragline, good condition, at Dallas, Tex.

Model K-12 Insley dragline, S/N 1801, 35' boom, U-9 Int. gas engine, ⅝-yd. bucket, at Dallas, Tex.

11-B Bucyrus-Erie transit hoe, S/N 119440, GD-3 Cont. gas F226 engine, deluxe seat, foot throttle, rear fenders, dipper rack, 8:25 tires, like new, at Lubbock, Tex.

15-B Bucyrus-Erie, hoe, S/N 116629, 34" blade type side cutters, D315 Cat. engine, battery lighting and electric starting, tractor type tracks, extra counterweight, w/clamshell and dragline equipment, like new, at Lubbock, Tex.

BROWNING-FERRIS MACHINERY CO.

Dallas, Texas	**Greggton, Texas**
305 Exposition Ave.	**Highway 80**
TA 3-8121	**PL 9-2761**
Lubbock, Texas	**Houston, Texas**
2424 Clovis Road	**2619 Texas Ave.**
PO 5-7455	**CA 5-3231**

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1 Northwest 80-D shovel and dragline.
2 Northwest No. 8 draglines.
1 Marion 151-M 6-yd. shovel.
1 Marion 4161 dragline equipped with 120' boom and 5-yd. drag bucket.
EXCAVATING ENGINEER
Box 3744
South Milwaukee, Wis.

Bucyrus-Erie model 44-B, 2-yd. shovel, equipped with fully enclosed steel cab; power boom hoist; crawler mounting 13'8" long, 11'2" wide overall, 27" wide treads. Buda Lanova 6-cylinder, 6¼x8¾", 6DH-1611 diesel engine with electric starter. 6,400 pounds cast iron as ballast. Weight: 122,150 lbs. $20,000 FOB Anna, Ill.
Write - wire or phone L. L. Freeman.
BRANDEIS MACHINERY & SUPPLY CORP.
P.O. Box 27 **Evansville, Ind.**
HArrison 3-4491

SMALL SHOVELS, CRANES, DRAGLINES — UP to 2½ YDS.

Bucyrus-Erie 51-B
New Track Rollers
½ Price

Aggregate Equipment & Supply Co.
811 Lehmann Bldg. **Peoria, Ill.**

7—P&H model 955 diesel draglines with Waukesha 6 WAKD engine, 70-ft. boom, crawler mounting 18'3" long overall, 12'8" wide overall, 42" wide treads, 5 to 7 years old, location western Pennsylvania. Inspection gladly arranged.
EXCAVATING ENGINEER
Box 3747
South Milwaukee, Wis.

Shovels and Cranes

Bucyrus-Erie model 38-B, 1¼-yd. shovel on crawlers. Powered by Caterpillar diesel engine. Shovel in excellent condition. #8925. $30,000 FOB Elizabethtown, Ky.
P&H model 255-A, ¾-yd. shovel, crawler mounted. Powered by Caterpillar model 315 diesel engine #5918. $14,500, FOB Elizabethtown, Ky.
Unit model 1020, ¾-yd. shovel. Powered by GMC 3-71 diesel engine. #292. $5,000, FOB Elizabethtown, Ky.
Lorain model TL-20 dragline excavator, crawler mounted, with 22" wide treads, 45' boom, fairleads. Powered by Waukesha gasoline engine. #5920. $8,500 FOB Evansville, Ind.
Koehring Model 304, ¾-yd. shovel on crawlers. Powered by International model UD-14A diesel engine. #8921. $5,500 FOB Elizabethtown, Ky.
Lorain model 40, ¾-yd. shovel on crawlers, powered by gasoline engine. #7912. $4,500. FOB Elizabethtown, Ky.
Lorain model L41, ¾-yd. crane, dragline, clamshell combination, 40' boom, tagline and fairleads, pendant suspension. Powered by Caterpillar model 318 diesel engine. #9810. $8,900 FOB Louisville, Ky.
Bucyrus-Erie model 10-B, 1952 model, ¾-yd. shovel, crawler mounted. Powered by Buda gasoline engine. Also can furnish dragline and clamshell attachments. #12815. $7,500. FOB Paducah, Ky.
Lorain model L50J, 1-yd. crane, dragline, clamshell combination, 70' boom pendant suspension, tagline and fairleads. Powered by Waukesha 140 GK gasoline engine. #686. $14,000 FOB Louisville, Ky.

Shovel and Crane Attachments

Koehring model 304 shovel front attachment, ¾-yd. capacity. Like new condition. #398. $1,900 FOB Elizabethtown, Ky.
Write - wire or phone Jim Waddell.
BRANDEIS MACHINERY & SUPPLY CO.
P. O. Box 1705 **Louisville, Ky.**
MElrose 7-4741

Northwest model 80-D shovel with 2½-yd. Esco bucket, 30" treads, model 21 Murphy diesel engine. Serial #13119, Price FOB White Haven, Pa. $26,500.
E. F. CRAVEN CO.
Greensboro, N. C.

54-B electric shovel with 4-yd. coal bucket and 1,000-ft. trailing cable.
51-B serial #117533 tagline with light plant 3 years old.
POWER SHOVEL CO.
4915 Massachusetts Ave. **Indianapolis, Ind.**
LI 7-9636

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

International model TD-24 diesel tractor, Serial TDE-5394, equipped with Bucyrus-Erie straight blade bulldozer, Bucyrus-Erie model P-29 rear mounted double drum cable control unit, seven roller track frame, 22" grouser tracks. Good condition. $10,750.

Allis-Chalmers model HD-20 diesel tractor, serial HD-20H-3461, equipped with torque converter, crankcase guard, roller guards, electric starting, push plate, powered by GM model 6B-1641 diesel engine, serial 62601RA. This tractor has a Caterpillar model 25 rear mounted double drum cable control, serial unknown. Tractor in fair condition. Price on application.

Allis-Chalmers model HD-20 diesel tractor, serial HD-20H-5931, powered by GMC diesel motor, torque converter, crankcase and roller guards, electric starting and push plate. Tractor in fair to good condition. $9,250.

Allis-Chalmers model HD-20 diesel tractor, serial HD-20H-5759, powered by GMC diesel engine, torque converter, electric starting, crankcase and roller guards, and push plate. Tractor in fair to good condition. Price on application.

Allis-Chalmers model HD-21 torque converter, diesel tractor, serial No. HD-21A-8528, equipped with Gar Wood model 281 rear mounted double drum cable control unit. Gar Wood straight blade bulldozer, roller guards, crankcase guard, lights, 26" grouser tracks. Good condition. $19,500.

Allis-Chalmers model HD-19 diesel tractor, serial 1603, equipped with Gar Wood model HD-19R straight blade bulldozer, track roller guards, electric starting, lights, torque converter. Tractor in fair condition. $5,200.

Caterpillar model D4 diesel tractor, serial 7U-25463-SP, equipped with Caterpillar model 4-S hydraulic controlled straight blade bulldozer, Unimatic model CW-4 ditcher, with 10" wide digging buckets, 20" wide discharge conveyor, all hydraulic, counterweight box. Tractor is equipped with electric starting, 16" wide grouser tracks. Machine in good condition. $7,500.

Caterpillar model DW10 diesel tractor, serial 1V2740SP, equipped with Caterpillar model 15 scraper, serial 4W-5359, Caterpillar model 21 cable control, serial 5C-4137, electric starting, power steering, air brakes, lights, 12:00x20 tires front and 21:00x25 rear on tractor, 21:00x25 tires on scraper. Price on application.

Caterpillar model DW10 diesel tractor, serial 1V-2769-SP, equipped with Caterpillar model 15 scraper, serial 4W-5397, Caterpillar model 21 cable control, serial 5C-4160, electric starting, power steering, air brakes, 12:00x20 front and 21:00x25 rear tires on tractor, 21:00x25 tires on scraper. Price on application.

Case model LAI wheel type loader, serial No. 5223590, equipped with Lull model C-384 shovel loader, ¾-yd. material bucket, electric starting, 7:00x20 front tires, 18:00x26 rear tires. Good condition. Price on application.

Caterpillar model D4 60" diesel tractor, serial 2T-8776, equipped with Ulrich model 1U-39 hydraulic controlled loader, with ¾-yd. bucket, 78" wide, Caterpillar model 44 front mounted hydraulic control, counterweight box, 16" wide grouser tracks, crankcase guard, electric starting for gasoline starting engine. Good condition. $5,200.

International model TD-14 74" diesel tractor, serial No. TDF-21658T2, equipped with 20" grouser tracks, Cardwell hydraulic angle blade bulldozer, Cardwell model PBI-14 pipelayer, hydraulic system repaired, pipelayer completely checked. Fair condition. $5,500.

International model TD-14 diesel tractor, serial No. TDF-20852T2, equipped with Cardwell model PBI pipelayer, serial No. PBI-14-294, with counterweight, less boom, 20" grouser tracks, crankcase guard, machine in fair condition. $3,700.

Caterpillar model D8 diesel tractor, serial No. 2U-9403, equipped with Trackson model MD8 pipelayer, counterweights, crankcase guard. Tractor in fair condition. Location: Dodge City, Kansas. $9,500.

Caterpillar model D8 diesel tractor, serial No. 2U-6546, equipped with Trackson model MD8 pipelayer, crankcase guard, electric starting. Tractor in fair condition. Location: Dodge City, Kansas. $9,500.

Caterpillar model D8 diesel tractor, serial No. 2U-7940, equipped with Trackson model MD8 pipelayer, electric starting, counterweights, crankcase guard. Location: Dodge City, Kansas. $9,500.

Caterpillar model D8 diesel tractor, serial No. 2U-4875, equipped with Trackson model MD8 pipelayer, counterweights, electric starting, crankcase guard. Machine in fair condition. Location: Dodge City, Kansas. $9,500.

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

Caterpillar model D8 diesel tractor, serial No. 1H-8819SP, equipped with Trackson model MD8 pipelayer, complete with 18-ft. boom with snatch block, track roller guards. This tractor in good running condition having been cleaned and painted. $8,000.

Austin Western model super 99 motor grader, serial 99SW-570, powered by General Motors 4-71 diesel engine, with electric starting, cab, power steering, 6-wheel steering and drive, hydraulic side shift, torque converter, lights, windshield wiper, 12-foot blade, scarifier. This machine in good condition, has low hours, a steal. $14,750.

Galion model T-500 tandem drive diesel motor grader, serial 1359, powered by Cummins model JN6BI diesel engine, equipped with cab, scarifier, torque converter, power steering, hydraulic sideshift, lights, electric starting, four wheel brakes, 13 foot blade, 14:00x24 tires front and rear. Good condition. Low hours a bargain. $9,500.

Caterpillar model 12 tandem drive diesel motor grader, serial 8T-8694, equipped with cab, heater, lights, 14-ft. blade, power steering, electric starting, scarifier, 13:00x24 tires, front and rear, dry type air cleaner. Good condition. $10,500.

Adams model 610 diesel motor grader, serial 2810, Powered by IHC model UD16 diesel engine, equipped with cab, heater, electric starting, 12-ft. blade, 2-ft. extension, power steering, scarifier, four wheel brakes, 14:00x24 tires, front and rear. Fair condition. $4,950.

Bucyrus-Erie model 54-B crawler shovel, serial 58882, powered by Buda model 8DAS-1125 diesel engine equipped with Torcon model 3-17CR torque converter, 26-ft. boom, 18-ft. handle, 3-yd. Esco dipper bucket, low gantry, mounted on standard 36" flat pads. Good condition. Engine and torque converter recently overhauled. $32,500.

Bucyrus-Erie model 20-B crawler shovel, dragline combination, serial No. 16049, mounted on 20" flat narrow cats, equipped with 18'0" boom, 14'6" handle, ¾-yd. dipper bucket, used Bucyrus-Erie unit 1A dragline equipment including 35-ft. crane boom, sheaves, rotating fairlead, digging and hoisting ropes, power boom hoist rope. Price on application.

R. L. HARRISON CO., INC.
P. O. Box 1320 — 1801 4th St., N. W.
Albuquerque, N. M.

⅜-Yd. Shovel, Backhoe and Crane

Hansen model 31 crawler backhoe, International UD-6 diesel engine. Price includes shovel and crane attachments. A bargain. U-32 $3,400.

½-Yd. Shovels, Backhoes and Draglines

Austin-Western Badger shovel and backhoe. International UD-9 diesel engine. Good operating condition. FOB Idaho Falls, Idaho. U-116 $3,650.

Unit model 10-20 excavator, S/N 1719. Price includes crowd shovel, dragline, dragline bucket, backhoe attachment. Engine overhauled. Has extra engine and machine parts. Good condition. FOB Idaho Falls, Idaho. U-249 $7,950.

Link-Belt Speeder model LS-52 crowd shovel. Cat D-315 diesel engine. Very good condition. U-276 $10,750.

Bucyrus-Erie crowd shovel attachment for model 15-B excavator. Very good condition. U-197 $1,950.

¾-Yd. Crowd Shovel Attachment

Northwest crowd shovel attachment for model 25. New and unused. U-198 $1,950.

1½-Yd. Crowd Shovel

Bucyrus-Erie model 37-B crowd shovel. Powered by Cat 6-cylinder diesel engine. Fair condition. $11,250.

Dragline Buckets

½-yd. capacity dragline bucket. Good condition. U-142 $300.

Wellman 2½-yd. dragline bucket, model DXL. Has never been used. $1,200.

Call, wire or write today for information about these and our many other items of used equipment.

LANG CONSTRUCTION EQUIPMENT CO.
P. O. Box 1646 — TWX No. SU-278
Salt Lake City 10, Utah — Phone: DA 2-1241

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

Bucyrus-Erie model 22-B, serial #79795, combination ¾-yd. shovel and crane, 60' boom with pendant suspension, Caterpillar D318 diesel engine. Machine available as is or rebuilt.

Bucyrus-Erie Hydrohoe attachment for H-3 Hydrocrane complete with 18" general purpose dipper, 20" utility dipper and all necessary fittings. Very good condition.

Lorain model L40, serial #15639, combination shovel and hoe, 50' crane boom with fairlead and rudomatic tagline. Fair condition. $5,000.

Lorain model TL-25, serial #19697, hoe. Machine completely rebuilt. $9,500.

Northwest model 25, serial #16381, hoe with D318 Caterpillar diesel engine. Good condition.

P&H model 150, serial #13833—½-yd. hoe with gasoline engine. $4,000.

BINDER MACHINERY CO.
Brighton St. — Union, N. J.
MUrdock 8-0060

Shovels

P&H model 150 ½-yd. truck crane, 35 foot boom, includes gas driven generator and controls to operate 9" magnet (does not include magnet), factory carrier with 11:00x20—14 ply tires, gas engines. Operating condition subject to inspection. $6,500.

Truck Crane

Lima Paymaster truck crane, model E34, ¾-yd. 35' boom, 6 cylinder Buda gas engine, Mack 6x6 truck carrier with 10—12:00x24 tires. As inspected. $12,000.

Shovels

Northwest 80-D, 2½-yd. shovel, S/N 15898, 30" tracks, 25' boom, 22'6" stick, Murphy diesel engine. Reconditioned—30 day guar. $42,500.

Shovel Attachment

Erie ½-yd. general purpose clamshell bucket with teeth (no serial number). Good condition. $750.

Tractors

Four (4) Allis-Chalmers HD-21A turbo charged torque drive tractors, 26" tracks, crankcase guard, track roller guards, canopy top, front pull hook, lights, push block and double drum P.C.U. These units only two years old. Excellent condition—30 day guarantee. Each $17,500.

Caterpillar D8, 24" tracks, high output engine, elec. starter, crankcase guard, canopy top and Cat 8S hydraulic bulldozer and No. 46 hydraulic control. Reconditioned 30-day Bonded Guarantee. $16,500.

Caterpillar D7, 17A series, 22" tracks, crankcase guard, oil clutch, elec. starter and Cat 7S hydraulic bulldozer. Reconditioned 30-day Bonded Guarantee. $18,500.

Scrapers

Four Euclid S-18 tractor-scrapers, Allison 3-speed torqmatic drive with model 28SH 21-yd. heaped scrapers, 4—27:00x33-30 ply tubeless tires. Good operating condition. $29,000 each.

Six Caterpillar DW20 tractors with Cat No. 20 scrapers. 20-yd. heaped capacity. Good operating condition. $25,000 each.

Trencher

Cleveland #95 trencher, S/N 3293, Option 5, 16" buckets, 21½" cut, 10" tracks, Continental gas engine. Recondition—30 day Guarantee. $7,500. Subject to prior sale or other disposal.

H. O. PENN MACHINERY CO., INC.
140th St. & East River — New York 54, N. Y.
CYpress 2-4800

H-2 magnet crane, serial #81118 mounted on International L-152, serial #76461, equipped with 24" magnet & SKW generator. Machine as is, in operating condition, price complete $5,000.

MOTT-MANBECK MACHINERY CO., INC.
Latham, N. Y.

MISCELLANEOUS EQUIPMENT

Following attachments were removed from model H-3 Hydrocrane stock: H-EQ-1 hoe equip. w/18" bucket, 20" utilities dipper with side-cutters, ¾-yd. clamshell bucket, tagline reel, 3¼" heavy duty digging ram. Net cash price complete $2,000.

SYRACUSE SUPPLY CO.
294 Ainsley Drive
Syracuse 5, N. Y.

3—Bucyrus-Erie 71-B tunnel front end attachments. $6,500 each. Excellent condition.

THE W. I. CLARK CO.
Box 501 — New Haven, Conn.

MISCELLANEOUS EQUIPMENT

Asphalt Pavers

Adnun blacktop paver. Excellent machine for laying stabilized base mix. Has been repaired and is in good operating condition. U-5 $1,400.

Barber-Greene model 879-A asphalt finisher. LeRoi gas engine. Has been completely rebuilt and is in excellent condition. U-170 $9,200.

Cabs

IHC TD-9 tractor cab. Excellent condition. U-76 $100.

Cat D4 tractor cab. Excellent condition. U-77 $125.

IHC TD-18 tractor canopy. U-309 $150.

Crusher

Cedarapids portable crusher and screening plant. 18x36 variable twin jaw crusher mounted on semi-trailer with fifth wheel pin. Overall dimension, 41'x8' wide and 12' high, 4'x10' vibrating type scalping screen. 27' long x 30" belt discharge conveyor. IHC UD-24 power unit is skid mounted and has outboard bearing. Overall condition is very good. U-389 $35,000.

Ditchers

Cleveland "Baby Digger" wheel ditcher, 4½-ft. digging depth. Hercules gas engine. Good working condition. U-1 $1,450.

Barber-Greene model 702 trencher with 5" cutting bits. Wisconsin gas engine. Rubber tire mounted. U-372 Bargain price. Good condition. $3,750.

Parsons model 88 trench liner. 7" paddles on chains, 14" paddles on extra chain. Gas engine. Good condition. FOB Idaho Falls, Idaho. U-373 $6,250.

Off-Highway Trucks

Euclid model 8LD rear dump truck, S/N 8956. 19 cu. yd. water-leveled HD rock body. Cummins supercharged HBS 6-cylinder diesel engine. Fuller transmission. Motor is rebuilt and like new. General condition is good. Very reasonable price. Have 4 other Euclid trucks of similar description available for sale or rental.

Miscellaneous

Be-Ge ST-770 hydraulic scraper, 6-yds. struck capacity. Excellent condition. FOB Boise, Idaho. $3,175.

Carco model "J" logging winch. 1955 model, good as new. U-65 Price is only $2,100.

Fruehauf trailer. Remodeled Army surplus. Good condition. U-28 $1,250.

Joy Heavy weight class 58-PH 7⅛" blast hole drill, 1951 model. Includes derrick, electric motor for air compressor and Roto-Clone. Needs approx. 550 cu. ft. air compressor. Condition mechanically fair. Could be converted to diesel at a minimum cost. Price includes some drill steel. U-348 $5,000.

Seaman-Andwall Trav-L-Plant, model DTM 47. Self-propelled. Pump assembly, spraybar, volumetric meter, relief and shut-off valve, 2-speed rotor and power steering. Main power is GMC 4057C diesel engine. Sub-assembly engine is Wisconsin V640. Has never been used. Truly bargain priced. U-409 $16,500.

Call, wire or write today for information about these and our many other items of used equipment.

LANG CONSTRUCTION EQUIPMENT CO.
P. O. Box 1646 **TWX No. SU-278**
Salt Lake City 10, Utah **Phone: DA 2-1241**

1—2-cu. yd. type TS Hendrix medium-duty dragline bucket complete with all fittings. Weight—3,550 pounds. Reduced price—$1,500. F.O.B. Evansville, Ind.

BUCYRUS-ERIE CO.
South Milwaukee, Wis.

3—¾-cu. yd. type AX medium-duty dragline buckets. Complete with all fittings. Weight—950 lbs. ea. Reduced price—$620 ea. F.O.B. Evansville, Ind.

BUCYRUS-ERIE COMPANY
South Milwaukee, Wis.

Air Tools

2—Joy crawler drills, drill class CTM1. These two drills are mates, both have had only one season's use. There is a good stock of extra parts with these drills.

Excavators

1—Bucyrus-Erie 38-B shovel, powered by GM6-71 engine with torque converter. This is one of the finest machines we have ever had in our used equipment stock.

1—Bucyrus-Erie 22-B powered by Cat D318 equipped as a hoe. This machine will meet with your approval.

1—Model L Quickway ½-yd. machine mounted on Federal truck. We have made minor repairs to this unit, it looks very good.

MISCELLANEOUS EQUIPMENT

Asphalt Equipment

1—848 Barber Greene asphalt plant, equipped with feeder, bucket elevators, rotary drier, gradation unit, dust collector, pug mill, Cleaver Brooks steam boiler, GM model 4-71 engine, Caterpillar model D13000 engines, also electric motors, wiring cables and panels that make this plant complete. We welcome inspections of this plant.

1—Pioneer paver model BP11. This machine has had all of the latest modifications.

1—Universal jaw crusher 12"x36" with removable wedges allowing expansion to 15"x36" opening.

Trucks and Bottom Dumps

2—Euclid 7LD rear dumps S/N 8887 and 8888 powered with Buda diesel engines, equipped with Parkersburg Hydrotarders, Fuller 5-speed transmission. These trucks are operable. Price $5,000 per unit.

6—WD60 Koehring Dumptors S/N D-3651, D-3867, D-4202, D-4550, D-4551, D-4009, powered by General Motors diesel engines. These machines rate a very clean classification.

2—Euclid bottom dumps 25FDT powered with Cummins engines. Tires 50% to 60% good. These tires are worth the asking price of the units.

Tractors

1—Near new Caterpillar D9 equipped with push-block, front power control unit, new rails, rollers and sprockets rebuilt. This machine was new in June of 1958.

1—International TD-24 Bucyrus-Erie double drum power control unit, straight dozer—a clean tractor priced right.

1—HD-11G Allis-Chalmers tractor shovel front end loader and model 9800 ripper. This machine carries a very good classification.

1—Caterpillar No. 9 ripper two shanks, a near new ripper at a tremendous savings.

1—Caterpillar cab for D9 in good condition $600.

Miscellaneous Equipment

1—Wagner model "C" Scoopmobile powered by UD-14A engine, equipped with scarifier attachment.

1—Woods Roadmixer model 54 powered by Chrysler industrial engine P.T.O. for D8.

1—Buda generator model P.C.D.-1879 BM-D 3091-C Novo gas starting engine connected to Westinghouse generator AC440 volt, 390 amps, 3-phase, 60-cycle Westinghouse Excitor. This unit is ready to go to work.

THE COLORADO BUILDERS' SUPPLY CO.
1534 Blake Street **Denver 2, Colo.**

FOR SALE—LEASE—RENT

1—1954 model 840 Barber-Greene Asphalt plant with heater and 5,000 gal. storage. $20,000.

1—879-A 10' Barber-Greene finisher with two 1' extensions. $9,000.

1—K-580 Link-Belt 2½-yd. shovel with D17000 Caterpillar engine. $10,000.

1—34 Lima Paymaster with 35' boom and Buda K-428 engine. $7,500.

1—TL-25 ¾-yd. Lorain shovel front with Amsco dipper. $550.

1—34-E Lima shovel attachment with Esco dipper with deck machinery. $1,500.

1—8-yd. Austin Western scraper w/6—10:00x20 tires. $600.

2—S-90 Bucyrus-Erie scrapers. $750.

1—S-7 Euclid scraper. $13,000.

1—101 Galion motor grader. $750.

2—76FDT Euclid 12-yd. scrapers. $15,000 each.

1—70FDT Euclid 12-yd. scraper. $15,000.

1—D8 Caterpillar crawler w/PCU and dozer. $13,500.

1—315 Joy air compressor, Int. diesel. $4,500.

1—125 Joy air compressor, gasoline. $2,185.

1—FMC2 Ingersoll Rand wagon drill with X-71 drifter. $925.

BUTLER-SPARKS EQUIPMENT CO.
CEntral 6-5585 **CHerry 2-9219**
1704 N.W. 6th **202 So. Lansing**
Oklahoma City, Okla. **Tulsa, Okla.**

Churn drill, serial No. 26865, model 29-T equipped for drilling 6" and 9" holes, weight of 9" drill stem—2,600—3,000 lbs., jack shaft 2⅞".

Bit dresser, serial No. 26866, No. 12, complete with 1 ram die, 1 hammer die for 9" type "G" 500 lb. bits, 1 anvil, 1 pincap for 3¼"x4¼" 7 API joint on bit, bit turning handle, 2 bit gauges.

Above two items are located at Keigley Quarry Works near Payson, Utah.

Churn drill, serial No. 26107, model 29-T.

This drill is located at the Columbia Iron Mining Co., Desert Mound Mine near Cedar City, Utah.

EXCAVATING ENGINEER
Box 3749
South Milwaukee, Wis.

WANTED TO BUY

H-3 old style single-ram clamshell bucket. Good operating condition. Write

CLYDE EQUIPMENT CO.
Mr. Bill Booth
Seattle, Wash.

POSITION WANTED

Heavy construction superintendent or opportunity to work up in large organization. Good health, 39, married with 3, cost conscious, 9 yrs. exp., concrete, dirt, and some asphalt. Personnel mgmt., and good organizer. Write Box 603, Artesia, N. M.

Notes . . .

Continued from page 69

local production of major parts for Cummins diesels. All parts will be interchangeable with U. S. parts and will be manufactured to the same standards. For many years Cummins has had distributors and service facilities in the Brazilian cities on Sao Paulo, Rio de Janeiro, Porto Alegre, Curitiba, Salvador, Recife and Belo Horizonte. A Cummins sales and service point will soon open in Brasilia, the proposed new capital city of Brazil. Cummins International concurrently appointed Reinhard G. Scheibner as manager—Brazilian operations, with headquarters in Sao Paulo. Scheibner's prior assignment was with Cummins in Sydney, Australia.

International Harvester Co., Chicago, Ill., has appointed five new territorial sales representatives. They are: John A. Salter, assigned to Syracuse, N. Y.; Howard J. Barrand, Dallas, Tex.; George M. Bookman, Charlotte, N. C.; James M. King, Oklahoma City, Okla.; and Russell H. Whiting, New York City, N. Y.

Marion Power Shovel Co., Marion, Ohio, appointed George W. Boulter as assistant manager of its mining division. Boulter was formerly safety director of the Montana state highway department. A registered professional engineer, he has over 20 years experience in various operating capacities in the non-ferrous metal mining industry. He was formerly an application engineer for Joy Mfg. Co., Pittsburgh, Pa., and Eimco Corp., Salt Lake City, Utah.

Digs and stacks 2,000 yds. an hour at "impossible" speeds . . . on 349 Timken® bearings

Weighing in at 2½ million lbs., this giant Bucyrus-Erie wheel excavator knocks out previous records for this type of equipment. It can dig and stack 2,000 yds., of over-burden an hour. And the stacker conveyor belt speed—1,000 fpm—was believed impossible to achieve for this type of service.

To take the extreme loads on the main wheel drive—heart of the machine—Bucyrus-Erie uses three Timken® double row tapered roller bearings. Two more are on the conveyor drive. And 344 Timken bearings roll the loads at other critical points. Timken bearings work better because . . .

1) *They take all loads.* Their taper lets Timken bearings take all radial and thrust loads. And full-line contact between rollers and races provides extra load-carrying capacity when needed.

2) *They practically eliminate friction, reduce maintenance.* Timken bearings are geometrically designed and precision-manufactured to roll true. And because they hold shafts concentric with their housings, Timken bearings make closures more effective in keeping lubricant in, dirt out, maintenance down.

Also, you get the *extra* advantages of Timken Company leadership such as service from graduate engineer salesmen qualified to work directly with your purchasing, engineering and production people. Service backed up by advanced research and testing facilities unique in the bearing industry.

When you buy Timken® bearings you get . . . *1) Quality you can take for granted. 2) Service you can't get anywhere else. 3) The best-known name in bearings. 4) The pace setter in lower bearing costs.* The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steels and Removable Rock Bits.*

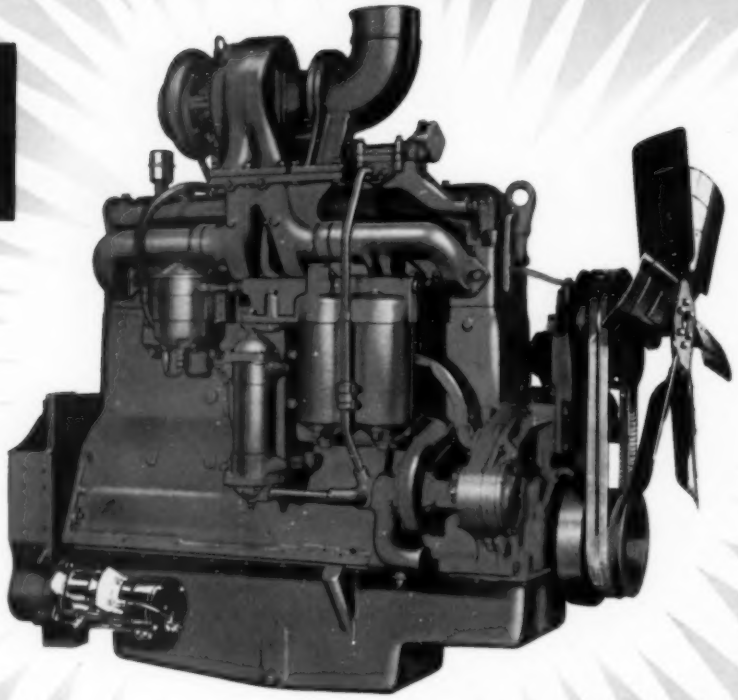
First in bearings for 60 years

BETTER-NESS rolls on

TIMKEN®

tapered roller bearings

Most economical diesel of its kind



The new Allis-Chalmers 21000 saves up to 3 gallons of fuel in every 10, compared with other diesels.

...has stamina to match

Here's the heavy-duty engine that was tested under full load with half the connecting rod and main bearings cut away. It was deliberately run hot and with only partial lubrication. It was operated with intentionally weakened parts and with imbalances. Its stamina was tested far beyond toughest field use to prove that its great economy was more than matched with ability to take it. Hundreds of field reports show the difference between this great engine and ordinary diesels!

The Allis-Chalmers 21000 and the companion 16000 (naturally aspirated) engines run clean, run longer, because of superior, advanced engineering. Get the story of this modern cost-saving power from your dealer. Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

***POWER* FOR A GROWING WORLD**

BE-17